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Slow-Coach Trooping

IT is strangely difficult to inculcate in the Service departments—in which must be included the Ministry of Defence—a clear understanding of the essential facts in relation to the economies of air trooping, and above all to appreciate the commercial considerations which apply in this most important matter.

The advantages of air trooping—the economy in both money and man-power among others—are not anywhere in dispute. Yet last year while only 57 per cent of trooping was done by air, the Parliamentary Under-Secretary for Air appears to think this satisfactory. In the year before the figure was 56 per cent and in the year before that, it was 54 per cent. This, the Air Ministry spokesman described with every complacency, as "a steady rise". Most people, we venture to think, would describe it as a virtual standstill.

All those who are concerned with the application of aircraft to military transport problems in peacetime, have stressed the obvious necessity for basing trooping arrangements on long-term contracts with the operators, on the obvious grounds that no business can be expected, or can possibly hope, to finance the purchase of new equipment, unless it is guaranteed employment for a considerable period. When it is a question of equipment, the units of which cost a million pounds or so each, it is completely unrealistic to consider as "long term" any contract of less than seven to ten years. Yet with a few three-year exceptions, the longest contracts granted by the Contracts' Division of the Air Ministry, which handles all Government trooping arrangements, is three years, and the vast majority, practically all in fact, are no more than two and a half. Yet the Air Ministry persists in describing these as long-term contracts. When the Ministry of Transport arranges trooping contracts by ships, the term is normally ten to fifteen years. That makes commercial sense, and the Air Ministry's arrangements for air trooping make commercial nonsense.

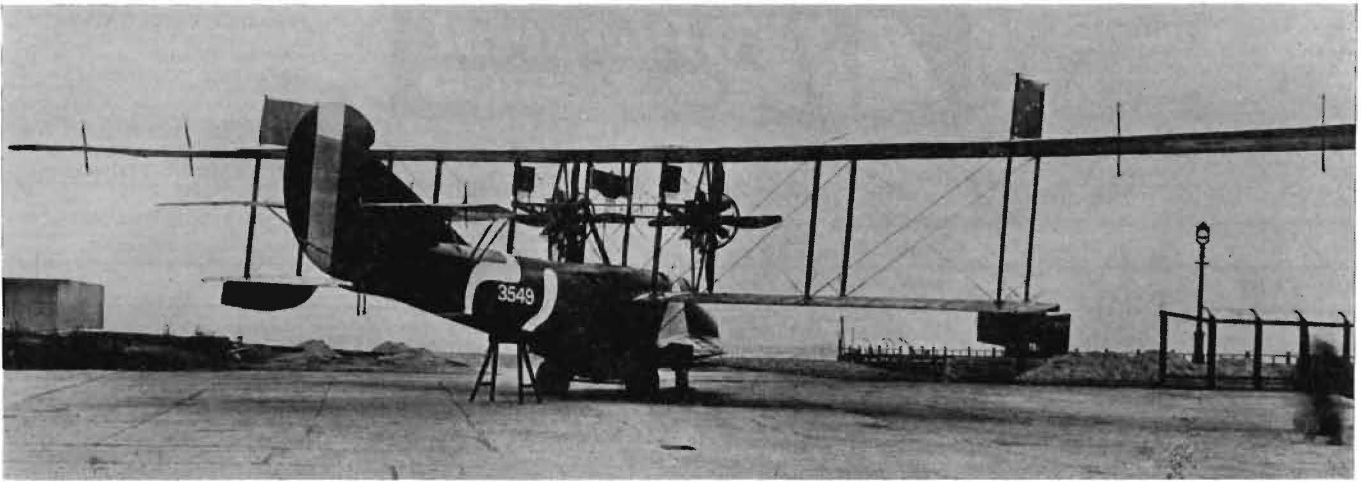
It is of no use to base the approach of such matters on the narrow ground of Air Staff appreciations in regard to this or that particular area, which is the principle which at present operates. The proper approach, we suggest, is a broad conception envisaging what all the three Services must, on a common-sense assessment, be expected to require, in terms of seat-miles and cargo-ton miles over a period of several years. This assessment must be undertaken at a high level, and should take account of war and emergency needs. Then perhaps some progress may be made.

On the surface it may appear that the situation is as satisfactory as Ministers would like us to believe. The departments are getting a very cheap rate, and the troops are moving, but in fact the present tender system among operators, desperately anxious to obtain business to keep their heads above water, means that the Government is getting its trooping too cheaply, because the rates obtained enable nothing to be put to reserve for the purchase of new equipment. This cannot be described as economic. The important point here is that the aircraft in which the troops are being carried are ageing and obsolete, and before very long most of them will be no longer equal to the task and there will be nothing to take their place.

This is the point upon which we suggest the Service departments should concentrate their attention. Not only will there be fewer and fewer aircraft available to the necessary requirements of safety and comfort, but there will be none at all able to supply that reserve of air transport in time of war which will be desperately needed, and not only by the Army, but by the Royal Navy and Royal Air Force as well. Too little is heard of the inevitable requirements of the Royal Navy and the Royal Air Force. This may be because neither Department nor the Ministry of Supply sees any hope of obtaining funds for the purchase of aircraft for Transport Command or by the independent operators. But this problem is not incapable of solution, as we shall presently show.

THIS MONTH'S COVER

THE Kaman HOK-1 has intermeshing counter-rotating rotor blades driven by a 600-h.p. Pratt & Whitney Wasp R-1340-48 engine. Latest version of this U.S. Navy and Marines' helicopter is a casualty evacuation model. Unusual design features are the close-set twin booms and triple fins, the central fin being added when the original 500-h.p. Continental R-975-40 engine was superseded by the P. & W. Wasp. Flotation gear or skis can be fitted instead of the normal four-point land undercarriage.



A production-type Curtiss H-4, *Small America*, photographed at Felixstowe. The engines are 100-h.p. Anzanis. (*Crown Copyright, Air Ministry.*)

U.S. Aircraft in the British Services 1914-1955

By "Chronicler" and Bruce Robertson

Part I

AIRCRAFT makers, to a greater degree probably than any other industry, depend for their livelihood upon military contracts. Although it is true that commercial aviation is a growing industry, planning and producing the aircraft required to carry on the business of the air lines cannot keep fully employed aircraft industries as large as those maintained in America, Russia, Britain, France and other countries. It is worth noting, for instance, that the total number of airliners serving the world routes today is smaller than the total number of Spitfires built between 1938 and 1946. Producing light planes for clubs and private owners is similarly a slender requirement when measured against military contracts.

It follows, therefore, that the fortunes of the aviation industry will be closely linked to the level of rearmament at any particular time, and this can be illustrated with great clarity by reference to the British industry in the past forty years or so.

At the outbreak of war in 1914 an aviation industry hardly existed. Various pioneers were building aeroplanes of their own design; small-scale production had been initiated here and there, and at the Royal Aircraft Factory (now the R.A.E.), Farnborough, a series of designs was being evolved to meet what were thought to be the likely military requirements. Under the impetus of the war, however, the industry expanded incredibly and contracts for production by the hundred of stock designs were placed on any company which had approximately the right kind of machinery for their manufacture.

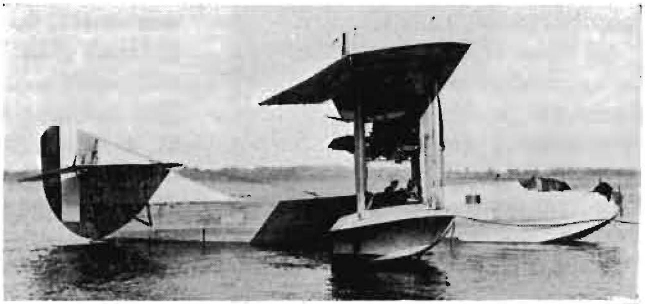
All efforts at home failed, however, fully to meet the requirements of the British flying services—R.N.A.S. and R.F.C. Consequently additional production capacity had to be found—and it was found in the U.S.A. The latter part of this article describes in detail the aid that came from America in this way, but it is convenient first to trace the subsequent fortunes of the industry at home.

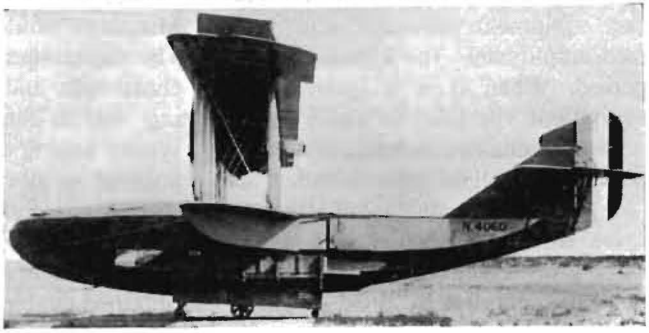
At the time of the Armistice, the industry was geared to production at a record high level, but almost overnight the demand disappeared, contracts were cancelled and the industry was out of work. There followed a period of about twenty years during which aircraft production was at no more than a trickle—while statesmen talked of peace at Geneva and Germany built bombers disguised as airliners.

Not until 1934 did orders begin to flow again in any substance. There was then introduced a modest rearmament programme, which in subsequent years was progressively stepped up. By 1938, with the German occupation of Austria, the programme was assuming "panic" proportions, the British industry was saturated with orders and the Government once again found it necessary to go shopping in America, whose aircraft industry was still suffering from a dearth of military contracts. The first British Air Mission to America was followed in 1939 by a British Purchasing Commission which functioned until lend-lease came into operation.

Through lend-lease arrangements, tens of thousands of aircraft of

Top: Developed from the H.4, the Curtiss H.12, *Large America*, was one of the best-known and most widely used flying-boats of World War I. This example, with 250-h.p. Rolls-Royce engines, is typical of the operational versions based at Felixstowe and elsewhere. *Bottom*: The prototype Curtiss H.16, a larger version of the H.12. Although ordered in large numbers, the H.16 did not see large-scale service before the end of the war in 1918. (*Crown Copyright, I.W.M.*)





all types were supplied to Britain between 1941 and 1945. Following the end of the war, these aircraft, with a few exceptions, were returned to America under the terms of the agreement. At the same time, the British industry slumped once again—although less severely than in 1918 and for a shorter period, for the "little war" in Korea in 1950 and the subsequent strengthening of N.A.T.O. in Europe brought a further sudden demand which, once again, the home industry could not meet quickly enough.

Consequently, under the provisions of the American Mutual Defence Aid Programme (MDAP) and through the Mutual Security Agency (MSA), American aircraft types were supplied to the R.A.F. and the R.N. in common with various other N.A.T.O. air forces. Further aid came through the off-shore procurement programme (OSP), in which American funds were used to place contracts for the production of British aeroplanes in European factories.

Now, in 1956, no further deliveries of American aircraft are scheduled to be made to this country; a considerable proportion of the OSP contracts has been completed, and once again the industry is running down as military contracts are cut or "stretched". The Minister of Supply has himself said as recently as last March that the industry will find it increasingly difficult to obtain orders from his Ministry in the future. The corollary to this is that the Minister will find it increasingly difficult to obtain aeroplanes from the industry when and if they are next wanted in a hurry.

Having thus noted, in the broadest possible outline, the three phases of American aircraft deliveries to Britain, this first instalment of the article will conclude with a detailed survey of the first phase, covering the period of World War I and the inter-war years.

The names of Glenn Curtiss, the American pioneer, and Commander John Porte, a British naval officer, rank prominently in the story of American aircraft supplied to Britain in the first phase. Glenn Curtiss had evolved, as early as 1912, from his work on float-equipped hydroplanes, a flying-boat which had a rudimentary hull containing the pilot's cockpit, and which is generally accepted as the world's first.

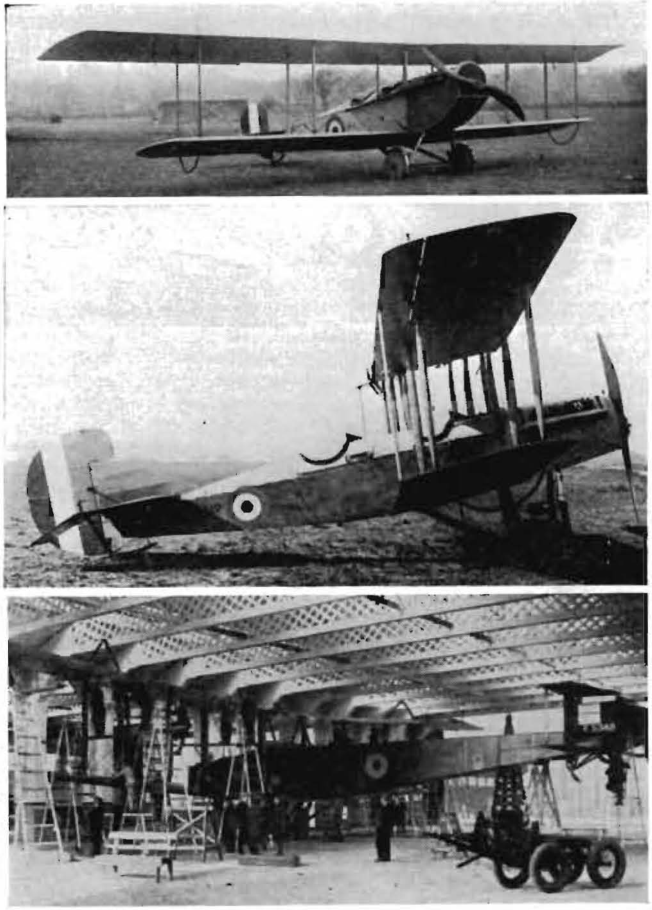
Thereafter, Curtiss pursued this particular line of development, backed up by an extensive publicity and sales campaign for the flying-boat which, he said, "embraces the safest flying with the finest sport in existence". During 1913, Captain Ernest Bass introduced the Curtiss flying-boat to England, housing his machine at what became known as Volk's Seaplane Station at Brighton.

As a direct outcome of this acquisition, the company of White & Thompson obtained a licence to build, in their Bognor works, boats to the basic Curtiss design. In passing, it is of note that one of these boats, built in 1914, was impressed into service with the R.N.A.S. at Calshot in August of that year, with the serial number 883. It was the first aeroplane of American design to serve with the British armed forces.

Commander Porte, who rejoined the Royal Navy in August 1914, had a little earlier been in America to plan an attempt, with Curtiss himself, to fly the Atlantic and win the £10,000 Wanamaker prize. As a result of this contact with Curtiss, he had become a protagonist of the flying-boat; back in the service therefore, he proceeded to press their claims and persuaded Commander Murray Sueter, then Director of Supplies (Air) at the Admiralty, to purchase for Britain the boat in which the Atlantic attempt was to have been made, together with a second similar example.

The first of these boats (number 950), was examined at Felixstowe in 1915. Although the standard of workmanship failed to impress, the need for flying-boats for patrol work in the Channel and North Sea was now becoming urgent, as a counter to German U-boat operations. Four more boats of similar type were ordered from Curtiss, and a batch of eight was simultaneously ordered from the Aircraft Manufacturing Co., in Britain—presumably to obtain better workmanship. The official designation of these boats was Curtiss Type H.4, although they were more generally known as America Boats.

With the two 90-h.p. Curtiss engines with which these boats were powered their performance was far from satisfactory. Four of the A.M.C. machines and one from America were re-engined with 100-h.p. Anzani radials, which gave a reasonable performance, and a further batch of fifty H.4s was ordered from Curtiss to be fitted with these engines; deliveries of this batch (the last H.4s procured) did not begin until March 1917.



Top to bottom: A Curtiss J.N.4, *Jenny,* in R.F.C. service. Several hundred Jennies were ordered by the R.N.A.S. in 1914-15. (*Crown Copyright, I.W.M.*) Of the 100 Curtiss R-2 reconnaissance biplanes purchased by the R.N.A.S. only about half a dozen are thought to have become operational. Others were used for training, and the example illustrated, 3510, for W/T experiments. (*Crown Copyright, I.W.M.*) F5349, the first Handley Page 0/400 built in America for the R.F.C., is shown in this photograph being assembled in England. (*Crown Copyright, I.W.M.*)

Meanwhile, Curtiss had developed a larger, improved and more seaworthy boat, the H.12. Fifty of these were ordered in 1916, without waiting for prototype evaluation, and this batch of machines, numbered 8650–8699 inclusive, became among the most famous used in the 1914–18 war, thanks in particular to the record of their exploits by C. F. Snowden-Gamble in *The Story of a North Sea Air Station.* Upon their delivery these boats became known as the "Large Americas", the earlier H.4s thereafter usually being referred to as "Small Americas". A further order for twenty-five H.12s was placed later, all but four being delivered before the Armistice led to the cancellation of the contract. A batch of 125 boats of an even larger design, the H.16, was also ordered from Curtiss, but full deliveries were curtailed by the Armistice.

The history of these later Curtiss boats is well recorded in the official histories and elsewhere. Less has been published, however—and nothing officially—on the other purchases made in America between 1914 and 1918 to supplement British production. The Admiralty took the initiative in arranging these purchases by sending a British Commission to America late in 1914, led by Squadron Leader Spencer Grey and Flight Lieutenant "Harry" Busteed, with technical assistants. In March 1915 the sum of £900,000 was appropriated by the Treasury for expenditure in the U.S.A. and of this more than two-thirds was in fact spent with the Curtiss company, which received orders for 300 aircraft (apart from the flying-boats already mentioned).

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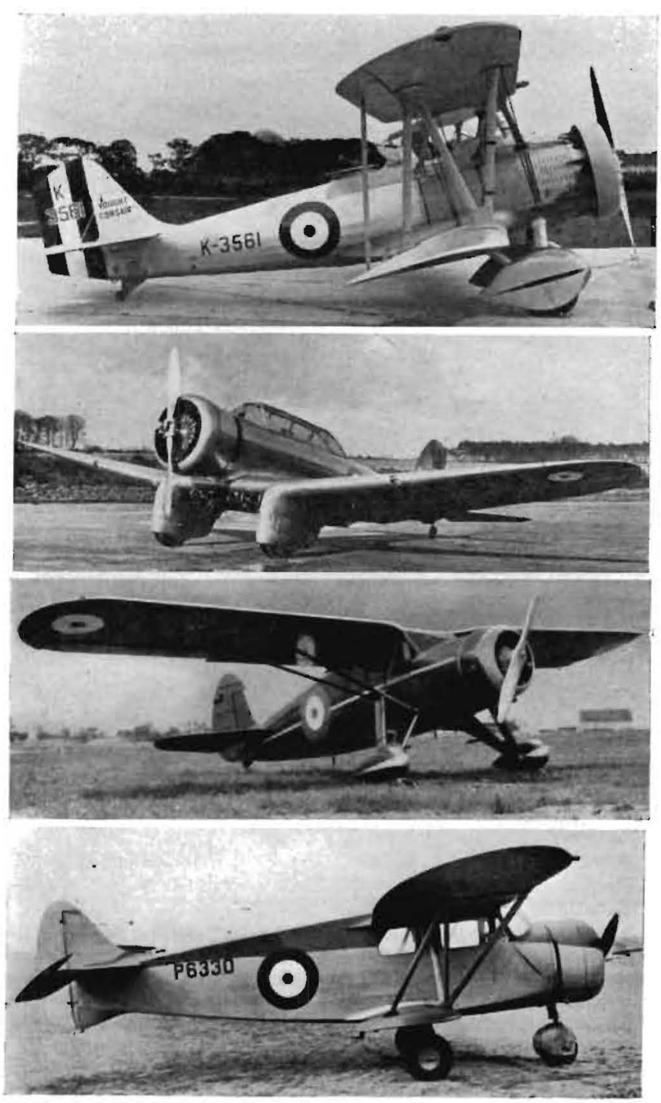

Top to bottom: The Vought V-66E Corsair biplane K3561 was one of a series of American prototypes purchased in Britain for technical evaluation. Another unusual type in British markings was K5053, the Northrop 2E attack bomber. It was tested at Martlesham and Farnborough in 1934-35. Little is known of the history of L7044, a Fairchild F24 procured in America for the use, it is believed, of the British Air Attaché in Washington. Early in World War II this Waco ZVN, P6330, was used at Farnborough to evaluate trycycle undercarriages. (*Crown Copyright, I.W.M.*)

U.S. Aircraft in British Service *(Continued)*

The first order placed by the Commission was for six Curtiss J.N.3 training biplanes (Nos. 1362–1367), followed early in 1915 by a repeat order for 100. The appearance of an improved version, the J.N.4 (or "Jenny", of immortal fame), led to the alteration of this contract to include J.N.4s after seventy-nine J.N.3s had been delivered. A further ninety J.N.4s was obtained by the Admiralty, and a batch of 100 was transferred to the R.F.C.; orders for another sixty were cancelled.

Lieutenant Nielson, R.N., took up residence at the Curtiss Buffalo factory in 1915 as the official representative of the Chief Inspector of Naval Ordnance, since a clause in the contracts required the aircraft to "be subject to their Lordships' approval". He was probably little impressed by the typically American demonstration, on 9th August 1915, of the erection and crating of a J.N.3 trainer; including panel building, cable-cutting, covering and initial doping, the exercise took 2 hours 55 minutes!

The Jenny was used at R.N.A.S. training schools for several years, but Admiralty plans to use another Curtiss type, the R.2, operationally were less successful. Armed with a fixed Vickers gun and interrupter gear, and carrying four 25-lb. bombs, it was powered by a 160-h.p. Curtiss XV engine—its major weakness. A 1915 contract ordered 100 of these machines, but the R.2 was rarely used operationally. Relegated to armament training, however, it remained in service until 1918; one was fitted experimentally with a 200-h.p. Sunbeam engine.

Curtiss OX-5 engines, including those redundant from re-engining the H.4 boats and others purchased direct from America, were used in several non-American aeroplanes. These included some B.E.2c's transferred from the R.F.C. to the Admiralty without engines, a Blackburn-built batch of B.E.2c's (9951–10000), one version of the D.H.6, and a batch of Maurice Farman "Longhorns" (C9311–C9335).

One other Curtiss type of the First World War remains to be mentioned—the Curtiss Triplane Hydroplane of 1915. It was a large flying-boat, similar to H.12, with four 250-h.p. Curtiss engines, and was the subject of much speculation—such as the following quotation from a contemporary American publication: "The new machines will carry six men, four rapid-firing guns and a gun capable of throwing a shell 32 *in. in diameter*. Their great mobility will give them supreme advantage and shells from the 3½-in. rapid-firing gun are likely to explode the Zeppelins. As these triplanes are water-based, they need not fear the Channel and will be able to follow their quarry almost to their home hangars."

The 32-in. missile was of course, nonsense—or a misprint! Known officially as Curtiss-Wanamaker Triplanes, twenty of these monsters were ordered but only one (number 3073) was delivered.

Contracts were placed in America with several other aircraft manufacturers, although their products proved considerably less useful, in fact, than the Curtiss machines. There were, for instance, the thirty-six Burgess Gunbus biplanes modelled along the lines of the 1915 Vickers Gunbus. After trials at Hendon this type was adjudged a failure and the entire batch went into the R.N.A.S. store at the White City where they were condemned in May 1916, together with their 140-h.p. Sturtevant engines.

Another company visited by the British Commission in 1915 was that of Thomas Bros. Aeroplane Co. The two brothers in question, W. T. and O. T. Thomas, were graduate engineers from South Kensington, London, and the chief engineer of the company had served his apprenticeship in the Sopwith and Vickers workshops. From this company, the Commission ordered, in two batches, twenty-four T.2 military tractor biplanes.

One other American aeroplane purchased by Britain was the Sloan-Day H.1 two-seater tractor biplane, an experimental type which the Commission decided to evaluate in England (at Hendon). Numbered 3701, it had a Hall-Scott A-5 engine and in the course of a sixty-four-minute flight it climbed to 3,000 ft. in 7 minutes 23 seconds and achieved a maximum speed of 84.7 m.p.h. No further examples were procured.

Mention can legitimately be made, finally, of the Curtiss Twin Canada, a landplane bomber designed by Curtiss and built in Canada. Porte, after visiting Curtiss at Buffalo in August 1915, went on to the company's Canadian works at Toronto to test, and accept on behalf of the R.N.A.S., the prototype of this design, with two 160-h.p. Curtiss engines. A production contract for 100 was placed, but cancelled before deliveries began. The Canadian Curtiss company also built twelve J.N.3s for the R.N.A.S.

In October 1917 the Ministry of Munitions took steps to initiate production, in America, of the Handley Page O/400 bomber, for erection in England. Sites were taken over at Gorse Mill No. 2, Hollinwood and Lilac Mill, Shaw, in Lancashire, close to the arrival port of Liverpool.

Alliance Aeroplane Co. (Messrs. Waring & Gillow) were appointed to manage the erecting shops and make good, by manufacturing, components lost at sea. A batch of 100 machines was ordered in America (numbered F5349–F5448), of which the first arrived on 20th August 1918—three months late. By November ten had arrived in England, but it is doubtful whether the full batch of 100 was completed.

In all, therefore, Britain received rather more than 600 aircraft from America between 1914 and 1918, on direct purchase contracts. Compared with the aid given between 1939 and 1945, this was a

(*Continued on page* 228)

Japanese Army Aircraft

By Richard M. Bueschel

Illustrated by Shorzoe Abe

Part II

KAYABA: The Kayaba Industrial Co. (K. K. Kayaba Seisakusho) was a prime producer of many products associated with aviation, among them the oleo landing gear system. Its President, Mr. Shiro Kayaba, was interested in aircraft development and in 1938 undertook sponsorship of a series of experimental tailless gliders. The first product of this sponsorship was the KH-1, a single-seat tailless glider with a single vertical fin on the centre line of the fuselage. It was designed by Dr. Hidemasa Kimura along lines originally conceived by Mr. Kumazo Hino, one of the pioneer aviators of Japan. Built at the Itoh Airplane Works in Chiba Prefecture, the craft first flew in February 1938. Originally assigned the certificate licence number of A-1017 in the sailplane classification by the Civil Aviation Agency of Japan, it was later presented to the J.A.A.F. as the A3-1. Only one of this type was built.

Extensive testing led to the design and construction of the Ku.2, a heavier version of the A3-1 with twin rudders on the wingtips. The sole prototype was tested by the J.A.A.F. in 1941.

The Army requested another tailless glider design, and this was undertaken by Dr. Kimura and Mr. Joji Washimi as the Ku.3. This ship featured a crescent wing platform and had no vertical tails. One prototype was built by the Japan Light Airplane Works in Tokyo in 1941. It crashed during a preliminary test flight. The Ku.4 was projected as a powered development of the Ku.3 and received a "Ku" designation even though it was not a glider. A single-seat, single-engined, tailless light plane with a pusher propeller, it had the same crescent wing as the Ku.3 with twin rudders added on the wingtips. It was not built due to a shortage of funds.

The J.A.A.F. had been interested in rotating-wing aircraft for a number of years and in 1939 the Testing Division of the A.A.H. purchased a Kellett KD-1A from the American firm. Sole prototype of this model, it featured an advanced version of the Kellett direct control rotor system and was powered by a 225-h.p. Jacobs L-4MA radial. During a series of preliminary tests the KD-1A was severely damaged in an accident. The ship was delivered to the Kayaba firm, then doing research on autogiros, with instructions to repair it for future testing.

On 26th May 1941 a prototype of the two-seat Kayaba Ka.1 was completed. This was an in-line engine-powered autogiro that appeared to be directly based on the Kellett type, including the Kellett developed direct rotor control system, permitting exceptionally short take-off runs. Powered by the Japanese-built Kobe 240-h.p. version of the Argus As.10C it was produced in quantity as an artillery spotter. It was also used on anti-submarine duties around the Japanese home islands. Operating from the *Akitsu-Maru*, the Army aircraft carrier, the Ka.1 carried two 132-lb. bombs for use against Allied submarines. Further developments were the experimental Ka.1-KAI tested with rockets at the tips of the rotors; and the Ka.2, a re-engined Ka.1 powered by a Jacobs L-4MA. Only one was built.

KOBE: The Kobe Steel Works (K. K. Kobe Seikosho) entered the aircraft industry when they obtained licences to build the German Argus As.10C engine as the Kobe 240 h.p. Late in the war Kobe undertook construction of two prototypes of the Type Te-Go Observation Machine, similar in concept to the German Fiesler "Storch", one of which was delivered to Japan in 1941. Designed by Prof. T. Miki of Osaka University by the order of the Army Artillery, the aircraft was refused a "Ki" number by the A.A.H. on the grounds that it was an observation *machine* and not an airplane. Only one of the prototypes was test flown, and ultimately both were destroyed in a hangar of the Kobe plant during a B-29 raid.

KOKUSAI: Japan International Air Industries, Ltd. (Nippon Kokusai Kogyo K.K.) was formed in June 1941 following a merger of Japan Air Industries, Osaka and the International Aircraft Co., Tokyo. Prior to the merger J.A.I. produced a small high-wing, twin-engined civil transport plane as the *Teradakoken* TK-3. It first flew in June 1938 and was powered by two *Kotobuki III* radials of 450 h.p. Two prototypes were built, and it was designed to carry eight to ten passengers. The J.A.A.F. showed interest in the type and a military prototype was built as the Ki.59 Experimental Transport. Powered by two Ha.13a radials of 515 h.p., the prototype was completed in July 1939. Interior fittings were revised and the fin and rudder were greatly enlarged. First military product of the newly-formed Kokusai firm, it entered production in 1941 as the Type 1 Transport (Ki.59 "Theresa").

In December 1941 a Ki.59 was modified as a glider by removing the engines and landing gear and fitting skids to the bottom of the fuselage. Known as the Ku.8-I Experimental Transport Glider it could accommodate fourteen fully armed troops. Later prototypes were a complete redesign of the original with a new wing and fuselage. This version entered production in 1944 as the Type 4 Large Size Transport Glider (Ku.8-II "Gander") and was built at the firm's Hiratsuka plant until March 1945. The Ku.8-II carried fifteen to twenty armed troops or a mountain cannon and was the

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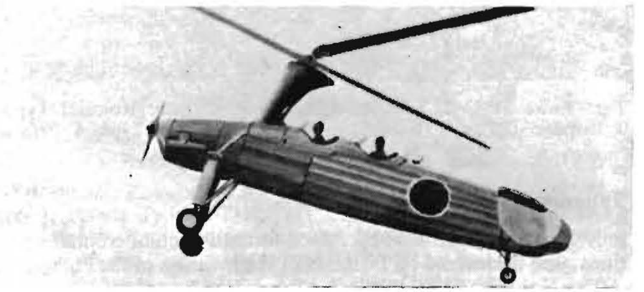
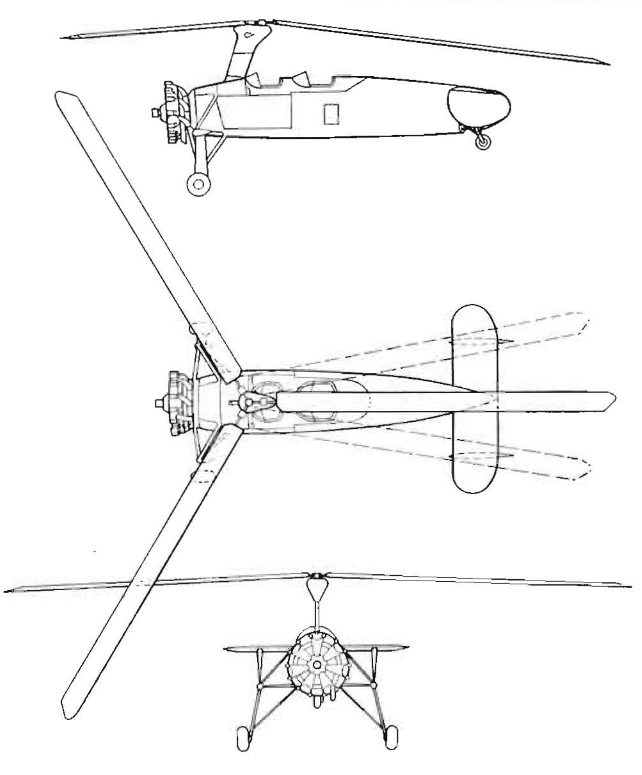
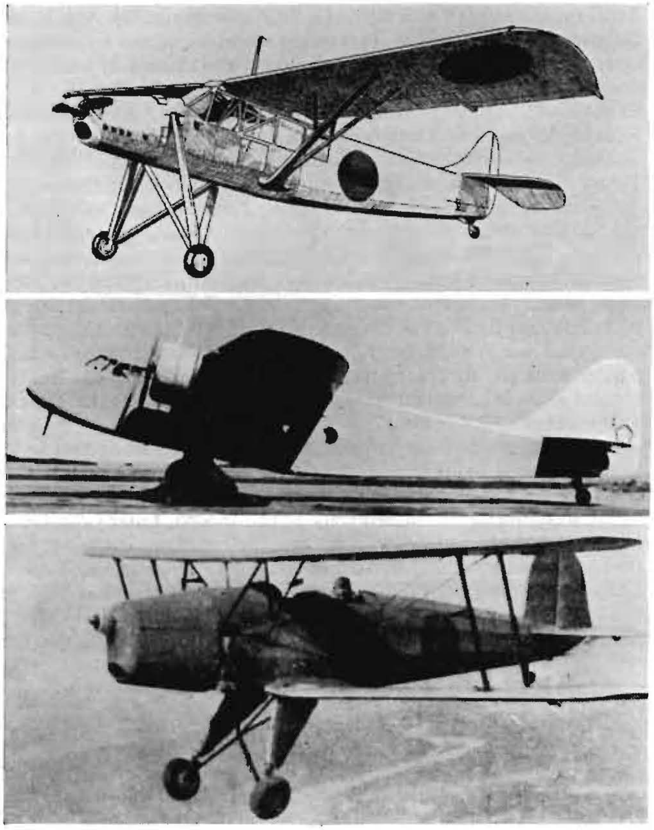
Top: Kayaba Ka.1. *Bottom:* Kayaba Ka.2.







Top: Kobe Te-Go Observation machine. *Middle:* Kokusai Type I Transport (Ki.59 "Theresa"). *Bottom:* Kokusai Type 4 Primary Trainer (Ki.86 "Cypress").

Japanese Army Aircraft (*Continued*)

only Japanese glider met by Allied forces in actual combat operations, first discovered on Luzon after the invasion of the Philippines.

The Kokusai Ki.76 "Stella" appeared to be a Japanese version of the Fieseler "Storch" and was probably designed with the use of the original German drawings. It was not a direct copy however, and in fact had a higher lift coefficient than the German aircraft, although somewhat unstable in flight. The prototype was completed in August 1941, and the ship entered production in 1943 as the Type 3 Command Liaison Plane. The prototype was powered by the 310-h.p. Ha.42, but service models carried the Ha.42b of 280 h.p., a lower-rated version for slow-speed flight. Cruising speed was 56 m.p.h., and the minimum speed was an amazing 25 m.p.h. In addition to liaison work the Ki.76 was also based on the carrier *Akitsu-Maru* which normally carried seven of these ships in convoy escort work. The carrier version had a deck arrester hook attached to the tail unit and carried two depth charges.

The firm's most numerically important aircraft was the Type 4 Primary Trainer (Ki.86a "Cypress"). Designed as a replacement for the Ki.17, it was based on the German Bü.131 "Jungmann" and its J.N.A.F. development, the Kyushu K9W1. Powered by the 110-h.p. Ha.47 based on the German Hirth Hm.504, the prototype was completed in late 1943. It was of mixed wood and metal construction; 1,037 models of the Ki.86a were produced. Due to a severe shortage of critical materials design work began late in 1944 on an all-wood version of the trainer known as the Ki.86b. Completed in February 1945 and also powered by the Ha.47, the Ki.86b weighed over 300 lb. less than the Ki.86a.

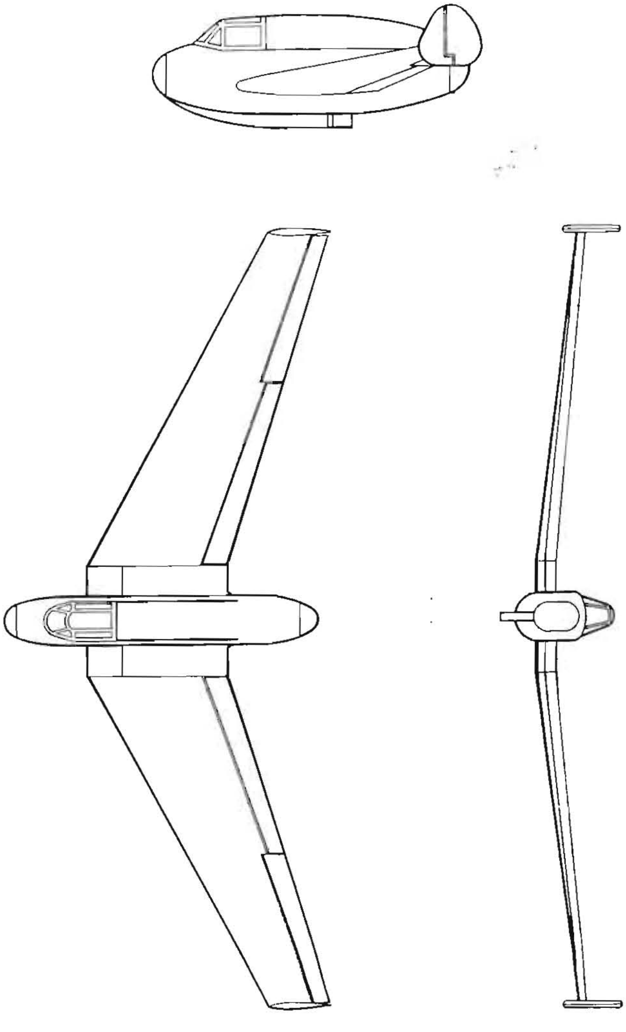
Production of the Ki.86a tapered down at the firm's Okubo plant after September 1944 and finally ceased to allow retooling for production of the Mitsubishi-designed Ki.57-II Transport.

Largest glider produced in Japan was the Ku.7 Experimental Transport Glider. Designed to give mobility to heavy armoured equipment, the Ku.7 could carry an eight-ton tank or thirty-two fully armed troops. Outwardly similar to the German Go.242, it was a twin-boom glider with a large pod-type fuselage and a loaded weight of over 26,000 lb. It is conceivable that the Gotha drawings were instrumental in its design as Go.242 and Go.244 plans had been supplied to the J.N.A.F. Air Mission to Germany and may have also reached the J.A.A.F. group. Design work began late in 1942 and the prototype was first flown in August 1944. A large loading hatch at the rear of the fuselage opened vertically allowing large-diameter equipment to be loaded.

A powered version, similar to the Go.244, was built as the Ku.7-II and later known as the Ki.105 Experimental Transport Plane. Modification of a Ku.7 was completed in December 1944 and its first flight was made in April 1945. Fitted with two Ha.26-II radials of 900 h.p., it had a top speed of nearly 170 m.p.h.

MAEDA: In early 1940 reports that gliders were being used in the European war to carry troops reached the J.A.A.F., resulting in the first Army specification for a transport glider. The Maeda Aircraft Institute (Maeda Koku Kenkyusho) was chosen as its designer, and work began in June 1940 under the company designation "Maeda 2600" (based on the current Japanese year) and the A.A.H. designation of Ku.1 Experimental Transport Glider. Designed by Prof. Hiroshi Sato of the Imperial University in Kyushu, the prototype was a shoulder-wing, twin-boom, twin-fin glider with a span of over 55 ft. Completed in the summer of 1941 its first flight was made at Tachiarai Military Airfield, Kyushu, on 1st September 1941. It passed its acceptance tests and entered production in 1942 as the Type 2 Transport Glider (Ku.1-I). It carried six to eight fully armed men plus pilot, and was normally towed by a Ki.51a. Its next development was the Ku.1-II with a single fuselage and a transparent nose section. Performance was higher than the Ku.1-I but the type

Kayaba Ku.2 Experimental Tailless Glider.



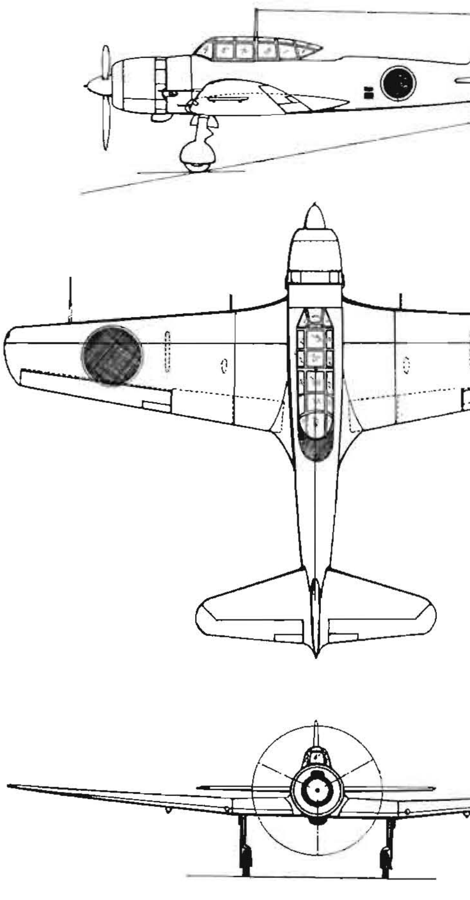
did not enter production. The Ku.1-III was a further experimental model in which the fuselage resembled a wing section profile.

Maeda's next glider was one of the most interesting aircraft developed in Japan during the war. Designed to the order of the Army Vehicle Troop Command (Rikugun-Kiko-Hombu) the Ku.6 was an armoured tank with detachable wings, the object was to fly the tank to the battle zone, detach the wings, and use it as normal land armour. Total weight of the entire unit was 7,712 lb., the tank itself weighing 6,174 lb. Developed as an anti-invasion weapon for rapid mobility of Army tank units, the prototype was completed in January 1945.

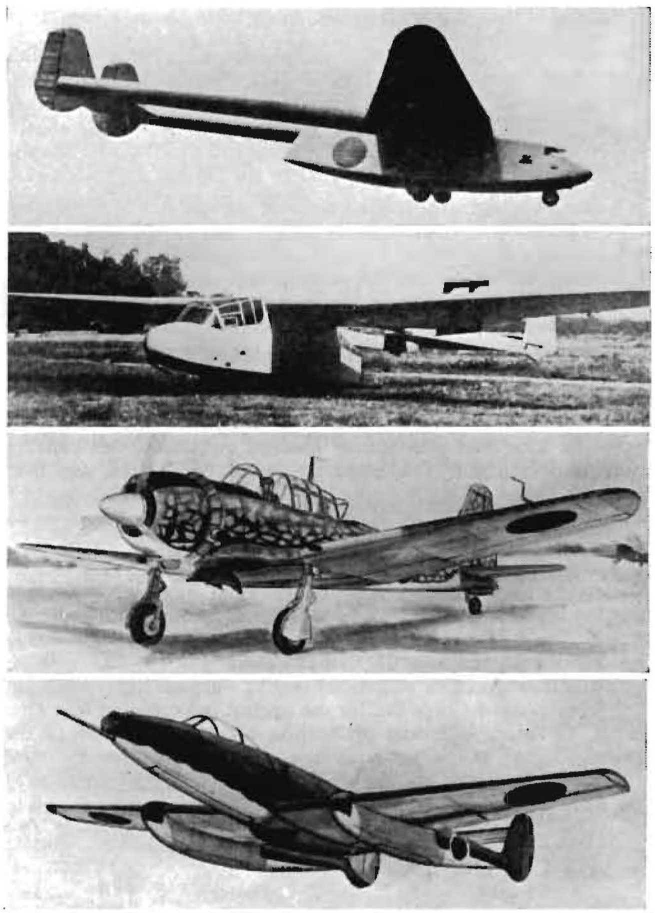
The Maeda Ku.10 was a special stunt-training glider based on the highly successful civil Maeda 703 sailplane. It was a single-seat mid-wing type with a fixed monowheel landing gear. Designed as a high-speed-tow glider, it was stressed to stand the rigours of stunting and special demonstrations by J.A.A.F. pilots.

MANSYU: The Manchurian Aircraft Manufacturing Co. (Mansyu Hikoki Seizo K.K.) began production of aircraft late in 1938 under the direction of the Japanese government. In addition to Mansyu-designed *Kokkoh* and *Mankoh* civil types, the firm produced a number of Japanese-designed military aircraft in its early years; the Type 94 Direct Co-operation Plane (Ki.4a and Ki.4b), Type 95 Fighter, Model 2 (Ki.10-II "Perry") and the Type 97 Fighter (Ki.27a and Ki.27b "Nate"). Although some of these aircraft were assigned to the Manchurian Air Force the majority of them were delivered directly to the J.A.A.F.

Prime production model was the Ki.27 fighter, backbone of the J.A.A.F. fighter units during the 1937–42 period, and one of the most famous aircraft in the Orient. Mansyu produced 1,300 of these aircraft, many of which saw service at Nomonkham. When the Manchurian Air Force school was established on 1st April 1940 with headquarters at Mukden, the Type 97 was chosen as the standard Manchurian fighter. At least one squadron operated during this period in Manchurian insignia.



Mansyu Ki.71.



Top to bottom: Kokusai Ku.7 Experimental Transport Glider ("Buzzard"); Maeda Type 2 Transport Glider (Ku.1-I); Mansyu Ki.71 Experimental Front Reconnaissance; Mansyu Ki.98 Experimental Ground Attack.

First original military design by Mansyu was the Ki.71 Experimental Front Army Reconnaissance Plane ("Edna"). Basically a redesign of the Ki.51a with a retractable landing gear, power was the Ha.112 radial of 1,300 h.p. A two-seat, low-wing monoplane, it carried a 20-mm. cannon in each wing. The Mansyu design staff was sent to the First Army Air Arsenal at Tachikawa where design work began in 1941. Construction was undertaken by the Army Arsenal and a total of three prototypes were built.

Designed as a replacement for the Ki.44 the Mansyu Ki.65 fighter was a single-seat, low-wing project on which design work began early in 1941 and detail design started in August 1942. It was projected in three versions; the Ki.65a powered by an Ha.111M of 1,850 h.p., Ki.65b with a 2,200-h.p. Ha.211-I and the Ki.65c powered by an Ha.211-V of 2,100 h.p. All three models had a span of 41 ft., carried two 13-mm. machine guns in the fuselage and a 20-mm. cannon in each wing. This fighter project was dropped late in 1942 or early 1943.

Mansyu undertook modification of the Type 97 Fighter as the Ki.79 Experimental Advanced Trainer and fitted an Ha.13a radial of 515 h.p. This aircraft entered production the same year as the Type 2 Advanced Trainer. A total of 3,710 Ki.79s were produced until the end of 1944. Although based on the Ki.27, production models differed considerably from the original aircraft. The Ki.79a was an all-metal, single-seat, low-wing monoplane with a fixed landing gear. It differed from the fighter in having an open cockpit, large headrest, tail wheel in place of a skid and no wheel pants. Power was the Ha.13a-I of 515 h.p. It mounted a single 7.7-mm. machine gun and was capable of carrying a 550-lb. bomb. The Ki.79b was a two-seat version of the Ki.79a, with seats in tandem fitted with dual controls.

(*Continued overleaf*)

Japanese Army Aircraft *(Continued)*

Construction methods were modified for the Ki.79c, a wood and steel tubular version of the Type 2. This was also a two-seat version of somewhat awkward appearance due to a set of rather lengthy skids fitted to the landing gear struts just above the wheels. Power was the 515-h.p. Ha.13a-II. Final production model was the Ki.79d, a single-seat model powered by the Ha.23/24 of 515 h.p.

Nakajima-designed aircraft produced during the war were the Ki.49-IIa, Ki.49-IIb, Ki.84-Ia, Ib and Ic. Production of the Ki.84 fighter began in 1945 at the firm's Harbin plant in Manchuria. Following the success of the Ki.100 modification, the J.A.A.F. requested that the Ki.84 be modified to mount an Ha.112 engine in order to overcome the serious operational difficulties encountered with the Ha.45 unit. Late in April 1945 the nearly-completed number 4Ki.84 was urgently modified to mount a 1,500-h.p. Ha.112-II and designated the Ki.116 Experimental Fighter. Due to the difference in weight the engine mount was lengthened and a Ki.46-III propeller was used without any change. Horizontal tail surfaces were also enlarged. The gross weight of the Ki.116 was over 1,000 lb. less than the Ki.84 and an additional 220 lb. reduction in weight would have been possible by careful attention to the design. Due to a limited testing period accurate performance was not known, but it seemed to approximate that of the Ki.100-I. In general it was a fine aircraft, admired by its test pilots for its reliable engine. Armament was two 20-mm. cannon plus two 12.7-mm. machine guns. Only one prototype was built.

Last Mansyu aircraft was the single-seat Ki.98 Experimental Ground Attack Plane. An unorthodox twin-boom, single-fuselage aircraft with a number of advanced design features, it was powered by a supercharged Ha.112ru radial of 2,200 h.p. mounted as a pusher in a fully enclosed cowling. Cooling was by means of flush intakes on the sides of the fuselage, and the use of an extension shaft gave the aircraft the appearance of being powered by an in-line engine of large diameter. Armament was one 37-mm. cannon plus two 20-mm. cannon, all mounted in the nose section. Work began in 1943 and one prototype was almost completed when the war ended. Mansyu also projected a fighter version of this aircraft as the Ki.98-II.

(To be continued)

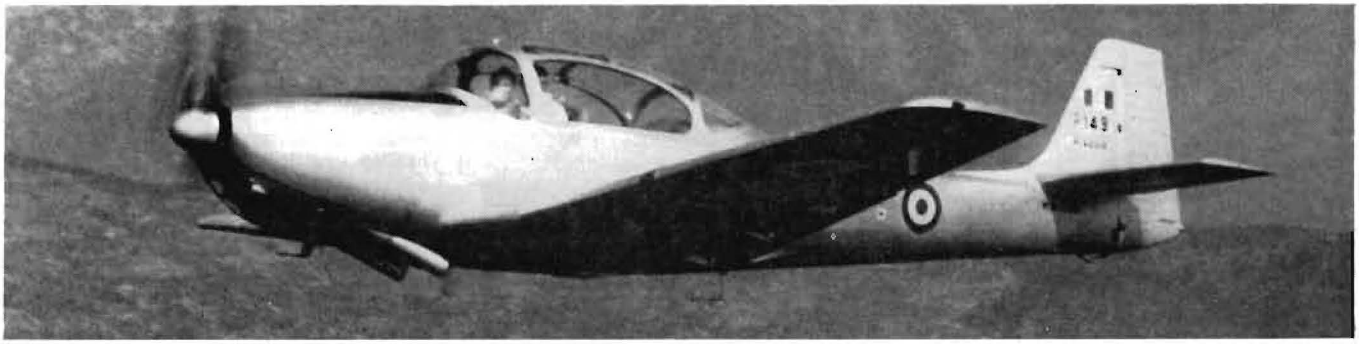
U.S. Aircraft in British Service *(Continued from page 224)*

drop in the ocean, but it was, none-the-less, an important contribution to the Allied war effort. A much greater contribution was in process of being made by the time of the Armistice in 1918, with the production in America of various British warplanes, primarily for the American Air Corps but for use against the common foe. That effort, however, including production besides the O/400 of the Bristol Fighter, D.H.4 and other types, is not part of this story.

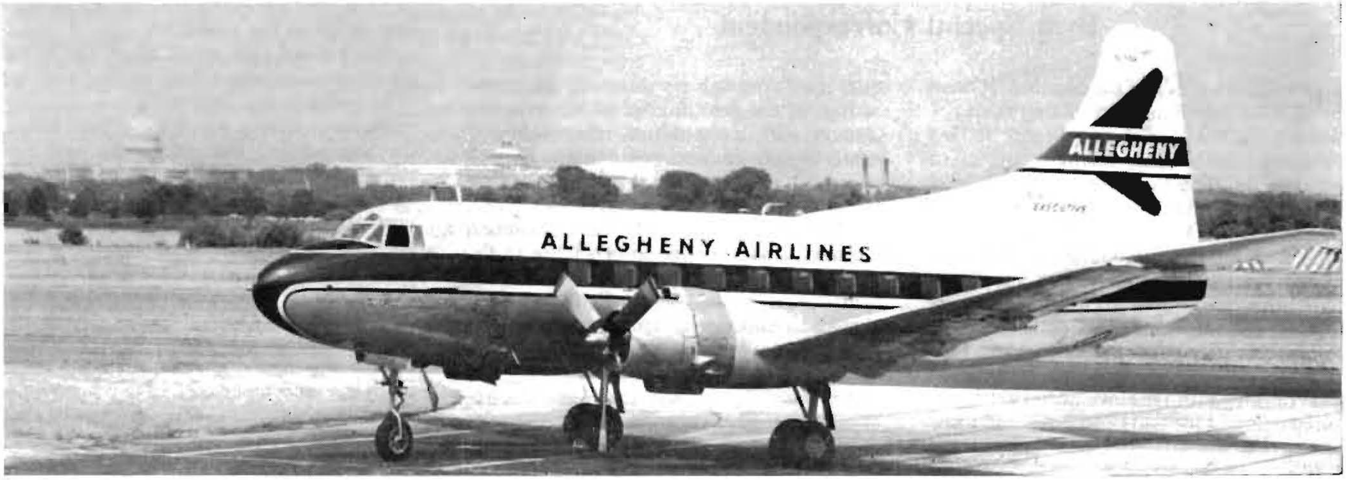
The next instalment of this series will deal with the purchases of the British Commissions of 1938 and 1939, but it may be as well to place on record here certain other American aircraft purchased between 1918 and 1938 and flown in R.A.F. markings. These were four in number, of which one, the Fairchild F.24 L7044, is thought to have been used only in the U.S.A., by the British Air Attaché in Washington. The other three were purchased for technical evaluation in this country and were K3561, the Vought V-66E Corsair biplane dive-bomber (1932), K5053, the Northrop 2E monoplane bomber (1934) and P6330, the Waco ZVN biplane used at the R.A.E. for tricycle undercarriage experiments (1939).

(To be continued)

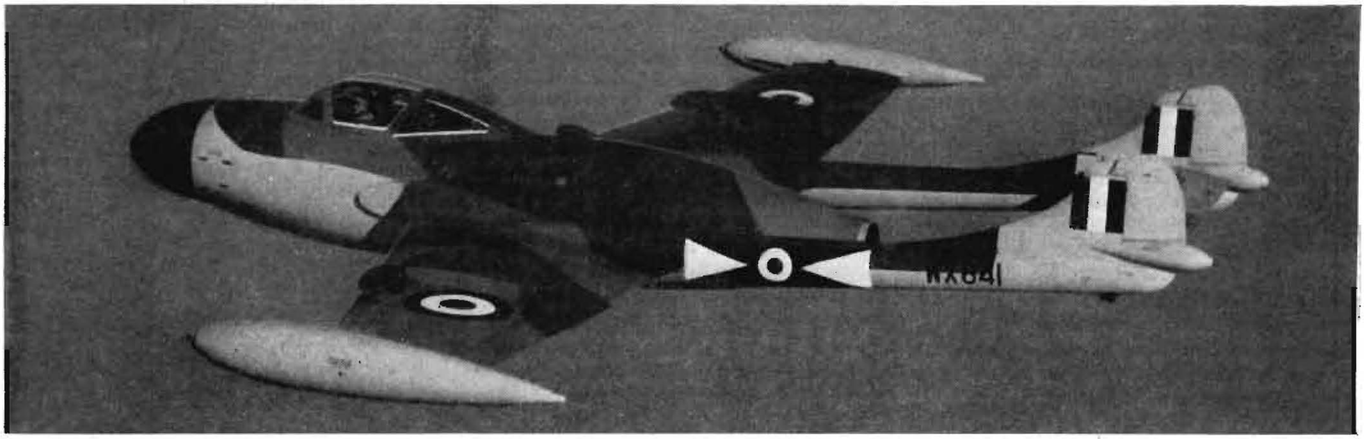
Aircraft	*Engine(s)*	*Serials*	*Quantity*	*Remarks*
Curtiss H.4	2× 100-h.p. Anzani	950–951	2	Designed for Porte's Atlantic attempt, 1914
Curtiss H.4	2× 90-h.p. Curtiss OX-5	1228–1235	8	Built by A.M.C. in England. 1228–1231 re-engined with 100-h.p. Anzani
Curtiss H.4	2× 90-h.p. Curtiss OX-5	1236–1237	4	From Curtiss
Curtiss H.4	2× 150-h.p. Sunbeam	1238		
Curtiss H.4	2× 100 h.p. Anzani	1239		
Curtiss H.4	2× 100-h.p. Anzani	3545–3594	50	Final batch from Curtiss. Delivered from 29/3/17 on
Curtiss H.12	2× 250-h.p. R.R. Eagle	8650–8699	50	The "Large America"
Curtiss H.12B	2× 250-h.p. R.R. Eagle	N4330–N4353	24	Fitted with w/t. Last three cancelled
Curtiss H.16	2× 250-h.p. R.R. Eagle	N4060–N4074	15	Improved H.12
Curtiss H.16	2× 320-h.p. R.R. Eagle	N4890–N4999	110	Final fifty cancelled
Curtiss J.N.3	1× 90-h.p. Curtiss OX-5	1362–1367	6	R.N.A.S. trainers. Delivered March 1915
Curtiss J.N.3	1× 90-h.p. Curtiss OX-5	3345–3423	79	3345 and 3393 transferred to French
Curtiss J.N.3	1× 90-h.p. Curtiss OX-5	8392–8403	12	Built by Curtiss (Canada), Toronto
Curtiss J.N.4	1× 90-h.p. Curtiss OX-5	3424–3444	21	3425 and even numbers from 3432 fitted with dual control
Curtiss J.N.4	1× 90-h.p. Curtiss OX-5	8802–8901	100	Final twenty not delivered. R.N.A.S. trainers
Curtiss J.N.4	1× 90-h.p. Curtiss OX-5	N5660–N5709	50	Not delivered
Curtiss J.N.4	1× 90-h.p. Curtiss OX-5	Unnumbered	100	R.N.A.S. contract, transferred to R.F.C. and numbered: A614–625, A898–903, A1254–1257, A3276–3280, A5160–5168, A5215–5224, A5492–5496, A4056–4060, B1901–1950. Includes some J.N.4A with armament
Curtiss R.2	1× 160-h.p. Curtiss XV	3445–3544	100	Intended for reconnaissance operations
Curtiss R.2	1× 200-h.p. Sunbeam	3453	(1)	Experimental engine installation
Curtiss-Wanamaker	4× 250-h.p. Curtiss	3073–3092	20	Triplane bomber. 3073 only delivered, 1916
Curtiss Twin Canada	2× 160-h.p. Curtiss XV	3700	1	Bomber landplane for R.N.A.S. Accepted 11/11/16
Curtiss Twin Canada	2× 160-h.p. Curtiss XV	9500–9599	100	Production contract, cancelled
Wright	1× 35-h.p. Wright	1373	1	No information; probably impressed in 1914
Burgess Gun-Bus	1× 140-h.p. Sturtevant	3657–3681	25	R.N.A.S. contracts. Machines stored at White City, condemned in May 1916
Burgess Gun-Bus	1× 140-h.p. Sturtevant	8258–8268	11	
Sloane-Day H.1	1× 125-h.p. Hall-Scott A-5	3701	1	Trials at Hendon, 1915
Thomas T.2	1× 90-h.p. Curtiss OX-5	3809–3820	12	R.N.A.S. contracts for military tractor biplane
Thomas T.2	1× 90-h.p. Curtiss OX-5	8269–8280	12	
Vought V-66E	1× 600-h.p. P. & W. Hornet	K3561	1	For technical evaluation
Northrop 2E	1× 750-h.p. Cyclone	K5053	1	For technical evaluation
Fairchild F.24	1× 145-h.p. Super Scarab	L7044	1	Retained in U.S.A. for British Air Attaché
Waco ZVN	1× 285-h.p. Jacobs L-5	P6330	1	For tricycle undercarriage evaluation



For the new Luftwaffe, seventy-five Piaggio P.149D four-seat liaison and training monoplanes have been ordered. The photograph depicts the first of the German 'D variants, albeit sporting Italian Air Force red, white and green roundels and the MM serial (Matricula Militare) MM559 under the tailplane. All handling instructions on the airframe, however, are printed in German. In May three Piaggio demonstration aircraft toured West German airports, including Dusseldorf: I-*PI*AM (P.149), and I-*PI*AW and I-*PI*AX, two P.148 two-seat Italian Air Force primaries in the Fokker S.11 Instructor category. The Piaggio P.149D is powered by a 260-h.p. Lycoming GO-435-C2 (geared 0.642 : 1) aircooled flat-six driving a three-blade airscrew. Maximum speed is 184 m.p.h.; cruising 163 m.p.h. at a.u.w. of 3,104 lb.; range 503 miles. Span 36 ft. $5\frac{1}{2}$ in.



Called the Martin Executive, N170A, "The Pennsylvanian", is one of four Martin 2-0-2s operated by Allegheny Airlines of Washington, D.C. These 2-0-2s have been converted from 36- to 40-seaters and, together with fourteen DC-3s, serve more than fifty cities in the Middle Atlantic area. The airline has a staff of 626 and in 1955 carried nearly 350,000 passengers (approx. 56 million passenger/miles). Compare this domestic local service line with one of the "Big Seven" domestic trunk lines, American Airlines, having more than 18,000 staff and carrying, in 1955, nearly 7.4 million passengers (approx. 4,360 million passenger/miles). Allegheny Airlines' colour scheme, green dressing on white top-decking and white under the windows. Green "boomerang" on tail cut by red band with white "Allegheny", and green lower band. Engines are two 2,400-h.p. P. & W. Double Wasp R-2800s giving maximum cruise of 270 m.p.h. Span 93 ft. 3 in.



Venom NF. Mk. 3, WX841, sports the black-and-white triangle markings of No. 141 Squadron, R.A.F. Fleet Air Arm counterpart of the NF. Mk. 3 is the Sea Venom F(AW). Mk. 21, differing from the land-based Venom by having power-folding wings, deck arrester-hook "lip" above jet orifice and deeper tail bumpers. On the port beam there are several noteworthy design features. Both versions have a navigation light set in port tail "bullet", and both versions have an assymetrical double-bubble dorsal shape to the canopy (the pilot's bulge on the port side being the deeper). The R.A.F.'s Venom NF. Mk. 3 has a whip aerial on each boom just forward of the roundel position while the F.A.A.'s Sea Venom F(AW). Mk. 21 has a whip aerial on the starboard boom and a non-whip aerial on the port boom. Power in each case is 4,850-lb. s.t. D.H. Ghost 103 (NF. Mk. 3) and 104 (F(AW). Mk. 21). Each has radar nose and four 20-mm. British Hispano Mk. 5 cannon. Maximum speed approx. 630 m.p.h. Respective dimensions, F(AW). Mk. 21 in parentheses: span 41 ft. 8 in. (42 ft. 10 in.; length 36 ft. 8 in. (36 ft. $7\frac{1}{4}$ in.); height 6 ft. 6 in. (8 ft. $6\frac{1}{4}$ in.).

The F-100 in Europe

By a Special Correspondent

DEVELOPMENT of the North American F-100 Super-Sabre, first of the "century" series of U.S.A.F. fighters, began on 3rd February 1949, when attempts began to improve the F-86 to attain supersonic level speed, and resulted in a design project for a modified F-86D with a 45-degree swept wing and tailplane. Coupled with a contoured fuselage to conform to the "area rule", this design had an estimated supersonic drag reduction of about 50 per cent compared with current fighters, and favourable U.S.A.F. reception of the "Sabre 45" was confirmed on 1st November 1951 by an initial contract for two prototypes and some production aircraft to be designated the F-100.

On 26th August 1952 the U.S.A.F. approved the mock-up of the F-100A, which had added refinements in the shape of a longer and slimmer fuselage, a "clamshell" integral canopy, and a low-set one-piece tailplane. The prototype YF-100A was completed by 24th April 1953 and was airborne for the first time a month later, on 25th May, in the hands of George Welch, then chief test pilot for N.A.A. It was twice flown supersonic that day, and showed an amazing increase in performance over all but the advanced research types then being test-flown. The U.S.A.F. Phase II flight tests were completed by 17th September 1953 and the prototype Super-Sabre established a world speed record at sea-level of 755.149 m.p.h. on 29th October, flown by Lt.-Col. Pete Everest, which still stands for a low-altitude run.

More remarkable in many ways than its air speed, however, was the development time of the Super-Sabre, despite many snags and several fatal accidents during later test flights. Within less than eighteen months after its first flight, the F-100 entered service with Tactical Air Command's 479th Fighter Day Wing, at George A.F.B., on 29th September 1954. The F-100A is powered by a Pratt & Whitney J57-P7 turbojet, developing over 10,000-lb. dry thrust, and some 15,000 lb. with afterburning, and is designed as an air-superiority fighter, for use against enemy fighters rather than bombers. For this, the Super-Sabre's standard armament of four of the new 20-mm. M-39E revolver cannon with a combined rate of fire of nearly 6,000 rounds per minute is well suited.

With the F-100B undergoing extended development as the F-107 fighter/bomber, the next version of the Super-Sabre to fly, which it did on 17th January, 1955 in the hands of Al White, was the F-100C. This is also an air-superiority fighter, but has up to eight external attachment points for various loads, provision for a flight-refuelling probe and system, and revised armament electronics. The F-100C also has the "B" series engine, a J57-P21, which is considerably more powerful. Dry thrust is about 12,000 lb., and with afterburning reaches a peak of about 18,000 lb.

By 14th July 1955 the F-100C was also in service, with the 322nd Fighter Day Group, Tactical Air Command, at Foster A.F.B., Texas, and on 20th August 1955 had established the first supersonic world speed record of 822.135 m.p.h., flown by Col. Horace Hanes. Early in 1956, deliveries started across the Atlantic to the U.S. 12th Air Force in Europe, to fulfill Secretary Quarles' promise that U.S.A.F. units overseas would receive the latest and best aircraft, and the first F-100Cs to be flown across went down to Sidi Slimane, in North Africa to set up a conversion unit. With 1,195 U.S. gal. of internal fuel, plus two 275-gal. underwing ferry tanks, the Super-Sabres are able to fly from Los Angeles via Goose Bay, Keflavik and Germany, where the first F-100C Wing has almost completely re-equipped.

Formerly operating with F-86Fs, the 36th Fighter Day Wing at Bitburg has three squadrons well on the way toward operational conversion, while another of its squadrons still has F-86Fs at Hahn, and yet a fifth retains similar aircraft at Soesterburg, in Holland. Pilots have converted from the barely transonic Sabre to the highly supersonic F-100 with little difficulty, and maintenance problems are certainly no worse with the newer aeroplane. After ten hours' flying on the F-100C, pilots return to their squadrons in Germany for operational and armament conversion. All that is needed to fly the Super-Sabre is a minimum of fifty hours on swept-wing types.

Despite its impressive size, and an all-up weight approaching 30,000 lb., the F-100 handles in a docile manner by virtue of its automatic slats, which are refinements of those on the F-86. With duplicated hydraulic power boost to all controls, the F-100 handles as lightly as its smaller predecessor, and has a similar maximum rate of roll, if required, of about 360 degrees/sec. The ailerons are of the inset, mid-span type now usual on highly-swept wings to minimise torsional effects and control reversal, their location preventing the installation of landing flaps. The F-100 therefore must be brought in on the approach at about 180 knots, and a ribbon-type tail braking parachute is used for every landing. Flaps have been fitted to the F-100D,

The low-set slab tailplane of the F-100 gives adequate longitudinal control over the wide speed range, but for extra stability, particularly during gun-firing at high speed, the Super-Sabre has pitch, yaw and roll stabilisers on all control surfaces, interlinked with the hydraulic boosters. These are a normal feature of most modern fighters, but are usually inactivated at low speeds to permit full deflection of the control surfaces. The F-100 has a single large air-brake surface, under the centre fuselage, which can be extended at any speed. Under normal conditions, the F-100C can achieve a maximum level speed of over 900 m.p.h. down to about 10,000 ft., or a Mach number of 12.2, but in mock combat its pilots have reached as much as Mach 1.6 during a dive without difficulty. Its operating ceiling is above 50,000 ft., which it can reach in about five minutes from take-off, and its pilots are now being equipped with partial pressure suits to maintain normal body pressure in the event of cabin depressurisation at those heights. They also have a cartridge-operated ejection seat, with automatic separation, and a new 30-ft. diameter B-5 parachute with "sleeve" type deployment to reduce opening shock at high speeds.

Afterburning is used for every take-off, and results in a great sheet of flame from the variable area titanium tailpipe orifice. Although boosting the power by about 50 per cent, the afterburner on the J57 more than doubles the fuel consumption, so its use is restricted to take-off, maximum climb (more than 14,000 ft./min.) and combat acceleration.

A prominent recognition feature of the F-100 is its long pitot boom projecting from under the nose, which keeps the pressure head clear of shock waves and reduces instrument error. An interesting point is that the boom is now hinged just under the thin-lipped nose intake, so that it folds upwards during ground maintenance to a less vulnerable position, and to reduce storage space. Despite its length, the boom cannot be seen from the cockpit. As yet, the F-100 is the only supersonic fighter in service throughout the world, with the possible exception of the Soviet "Farmer".

AIRCRAFT OF THE 1914-18 WAR

The Spad S.7

By J. M. BRUCE

THE Spad S.7 was the first truly successful aircraft produced by the Société pour Aviation et ses Dérivés, the Bleriot-owned descendant of the Société pour les Appareils Deperdussin. The S.7's predecessors had been the types A.2, A.4, D and E, of which the first three had a gunner's nacelle mounted in front of the tractor airscrew as on the B.E.9. The A.2 was produced in quantity and eleven A.4s were built.

The S.7 was a sturdy little single-seat fighter designed by M. Béchereau which first flew in May 1916. It was braced as a single-bay biplane, but the cable intersections were connected to the wing spars by short struts which gave an appearance of two-bay bracing. The prototype was powered by a 140-h.p. Hispano-Suiza engine, and the machine bore a strong resemblance to the Spad A.2.

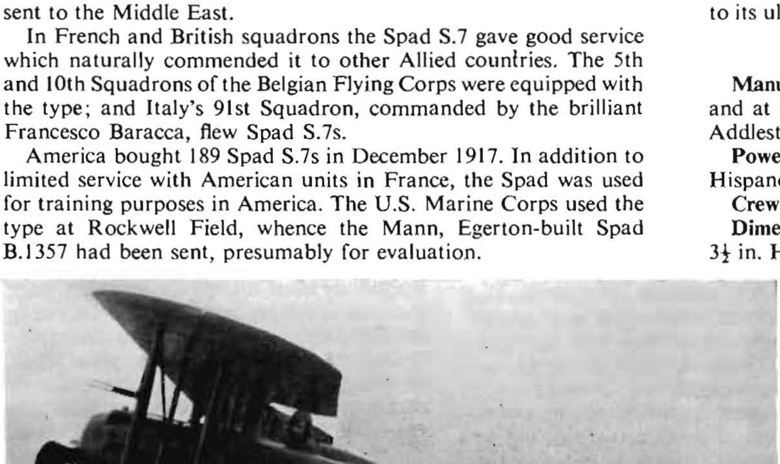
Production Spad S.7s became available in the autumn of 1916. They went into service with several *Escadrilles de chasse*, notably the immortal S.3, the unit known as *Les Cigognes* with which Georges Guynemer flew. Guynemer first flew a Spad late in October 1916, by which time, oddly enough, a single example was in use with the Royal Flying Corps and was attached to No. 60 Squadron. Production machines had the 150-h.p. Hispano-Suiza, and later Spads had more powerful Hispano-Suizas as they became available. An experimental installation of a 150-h.p. Renault was made in one machine.

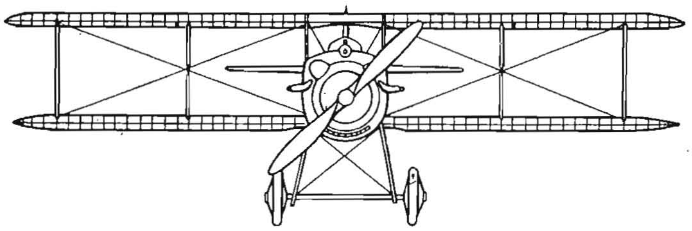
Both the R.F.C. and the R.N.A.S. wanted Spads. Many of the R.F.C. machines were bought by local purchase in France, and a batch of 100 (A8794–A8893) were built by the British Bleriot and Spad company at Addlestone. The Admiralty ordered its Spads from Mann, Egerton & Co. of Norwich, who produced their first (N6210) four weeks after the arrival of a sample Spad at the Norwich works. In December 1916 the Admiralty agreed to hand over sixty of its Spads to assist the R.F.C., and in February 1917 gave up all its Spads in exchange for all the Sopwith triplanes then on order for the R.F.C. Thus the Spad was never used by a naval unit, nor did the R.F.C. fly triplanes.

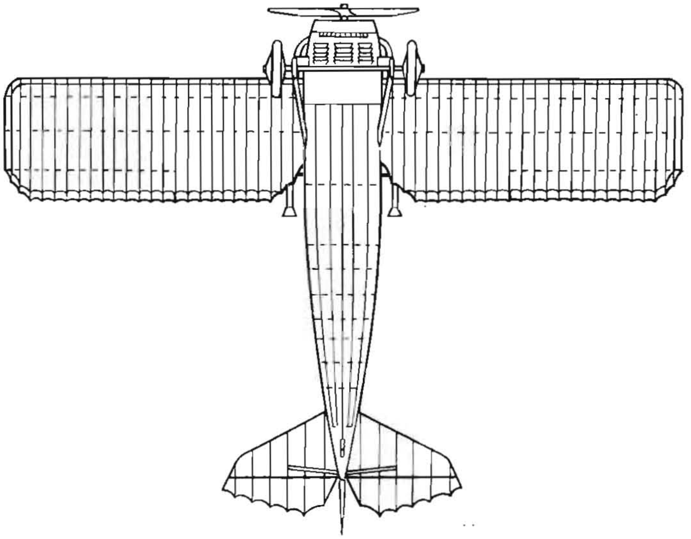
The only R.F.C. units to be completely equipped with the French scout were Squadrons Nos. 19 and 23, which flew Spads on the Western Front, and flew them with distinction during the Battles of Arras and Ypres. In Mesopotamia a few examples of the type were used by Squadrons Nos. 30, 63 and 72; only nineteen Spads were sent to the Middle East.

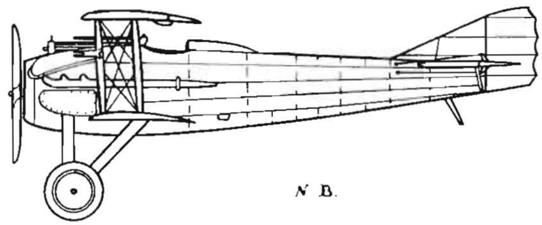
In French and British squadrons the Spad S.7 gave good service which naturally commended it to other Allied countries. The 5th and 10th Squadrons of the Belgian Flying Corps were equipped with the type; and Italy's 91st Squadron, commanded by the brilliant Francesco Baracca, flew Spad S.7s.

America bought 189 Spad S.7s in December 1917. In addition to limited service with American units in France, the Spad was used for training purposes in America. The U.S. Marine Corps used the type at Rockwell Field, whence the Mann, Egerton-built Spad B.1357 had been sent, presumably for evaluation.









The original S.7s were gradually withdrawn from operational use during the summer of 1917 as more powerful developments became available, and were generally replaced by Spad S.13s. The basic Spad configuration changed little throughout its development to its ultimate expression in the S.22 of 1918.

DATA

Manufacturers: Société SPAD, 19 Rue des Entrepreneurs, Paris, and at Quai de l'Industrie, Juvisy; The Air Navigation Co., Ltd., Addlestone, Surrey; Mann, Egerton & Co., Ltd., Norwich.

Power: 140-h.p. Hispano-Suiza; 150-h.p. Hispano-Suiza; 175-h.p. Hispano-Suiza 8Aa; 150-h.p. Renault.

Crew: One.

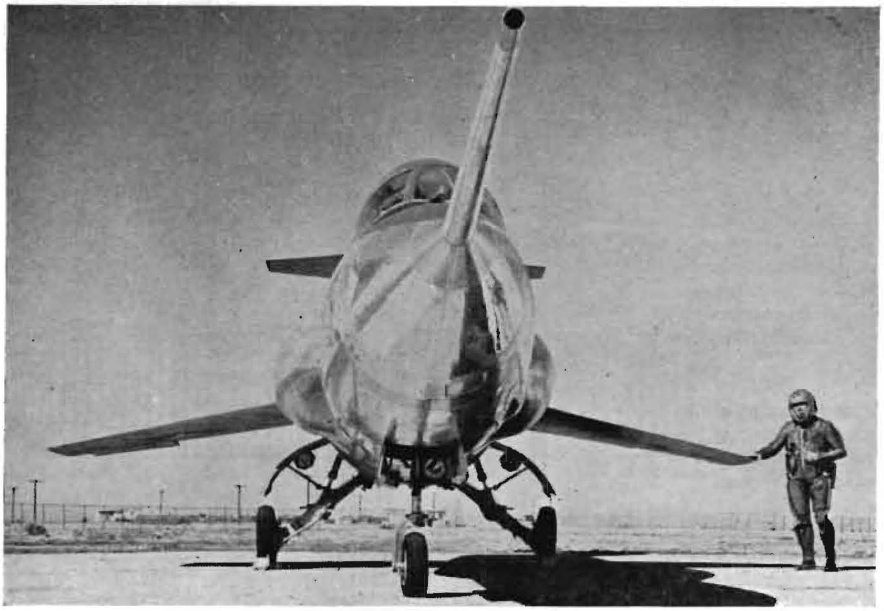
Dimensions: Span: Upper 25 ft. 8 in.; lower 25 ft. Length: 20 ft. 3½ in. Height: 7 ft.

Weights: Empty: 1,177 lb. Loaded: 1,632 lb.

Performance: Maximum speed: 119 m.p.h. at 6,500 ft.; 115.5 m.p.h. at 10,000 ft.; 107.5 m.p.h. at 15,000 ft. Climb to 6,500 ft.: 6.3 minutes; to 10,000 ft.: 11.5 minutes; to 15,000 ft.: 24.5 minutes. Service ceiling: 17,500 ft.

Number built: 5,600 were built in France, 200 in England (each British contractor built 100).

Service use: *Western Front:* Various French fighter *Escadrilles*, including S.3 (*Les Cigognes*), S.38, S.55, S.68, S.83 and S.124; R.F.C. Squadrons Nos. 19, 23 and 60; 5th and 10th Squadrons, Belgian Flying Corps. *Italy:* 91a Squadriglia (Baracca). *Mesopotamia:* R.F.C. Squadrons Nos. 30, 63 and 72. *Training:* Training squadrons at Wyton and London Colney. *America:* Flown at Rockwell Field by U.S. Marine Corps.



The F-104

"Boffin" Comments on the Lockheed Stub-winged Supersonic Fighter

THE ending of the erratically-kept secret of the Lockheed F-104's appearance has added another technical excitement to what bodes well to be a remarkable aviation year. It is certainly a queer-looking aeroplane, with its drooping, slender wing stubs, high tail and gangling broad-bosomed fuselage. Although there has been much talk by Lockheed people around the F-104, the amount of fact available is still strictly limited by security—the mystery of the air intakes is an excellent example of this. Because of all the secrecy, the best one can do is to look at the aeroplane from first principles—tempered by known Lockheed views on jet aerodynamics.

The guiding principles for designing a supersonic aircraft could be thus stated:

Minimum wing wave drag, consistent with sufficient lift;
maximum power for minimum size and weight;
fuel for an adequate operational range while supplying the enormous power needed for supersonic flight and acceleration.

To this must be added in the case of a manned aeroplane:

Controls effective throughout the speed range;
practical landing gear.
And for a "weapon system":
Lethal armament, designed as part of the load from the beginning.

The whole adds up to a tall order in which there is direct conflict between each requirement, so that the final result can only be achieved, as always, by the most careful of compromises. The designer has to select those features from among a mass of research data which seem most likely to fulfil his needs when developed to the full. Then the team gets into its stride and squeezes the last ounce out of the chosen instruments. It is here that an unfortunate tendency for engineers to blind themselves with enthusiasm for their own ideas often manifest themselves in the form of extravagant claims for the supreme virtues of their product. This is particularly true of the F-104 and some of Kelly Johnson's lectures on the superlative qualities of the "straight" wing—which are tantamount to a complete condemnation of anything triangular! This is not to decry the F-104, which is a truly remarkable brain child, but merely to indicate that its fond parent's praises should be taken with some reserve.

The origin of the F-104 lay in the superior altitude performance of the more lightly loaded MiG-15 over the F-86 in Korea. The resulting U.S.A.F. specification was for an "air-superiority fighter", that is an anti-fighter aeroplane as opposed to a bomber interceptor. To combine this with all-weather operation in an airframe of about the same weight as the Sabre, *but* with double the performance certainly shows that the compromises were well chosen.

Supersonic aerodynamics require, above all, slenderness; this is for two reasons, to keep down frontal area and to minimise the generation of shockwaves. Remember that the air is virtually solid and a supersonic body has to cut its way through. Streamlining as we understand it subsonically gives way to air compression as a means of making a passage. Some idea of the effect can be gained if one thinks of the aircraft as a loose-fitting piston forcing the fluid (air) against the sides of an invisible cylinder (uncompressed still air), thereby raising the pressure and temperature (shockwaves). Sharp entry points and edges ease the passage of the body, while long, slender tapers prevent the occurrence of additional shockwaves—which are generated wherever protuberances increase the area of the "piston". Where the tapered entry changes to a surface parallel with the body's centreline there is expansion, that is a reduction in pressure, which can be used to reduce drag.

Wave drag is enormous because the rise in pressure and heat absorb energy—which in turn is obtained from the potential energy in the fuel via the engine. Wave drag is kept low by minimising the frontal area of the fuselage, which means it has to be long in order to accommodate the huge quantity of fuel required. Nevertheless it must essentially be a four-foot diameter cylinder if it is to contain the pilot and engine, and it therefore has an irreducably minimum conical shockwave.

The wing is, however, the major source of wave drag. This is proportional to the span and the thickness ratio, therefore small span and low aspect-ratio are indicated—that is agreed by all. It is in the manner of obtaining the desired results that opinions differ radically, and feeling runs high, between the square, the triangle, the broad arrow, and the circle—but the latter is another story.

The "straight" wing is, of course, not straight at all, since it is acutely tapered so as to reduce the lift loads from the tip and, in the case of the F-104, the taper on the leading edge is equivalent to more than 25 degrees of sweep. On the basis of the spanwise line of the centre of pressure this is probably about 15 degrees, which will give the sweepback advantage of an increased c.g. range (albeit the minute span limits this severely) and the disadvantage of unfavourable spanwise flow at the stall. Still, by and large, the wing is set at right angles to the fuselage and so will suffer fewer twisting loads at high speed when the centre of pressure moves aft to the mid-chord line.

The thinness of the F-104 wing is a wonderful engineering effort. It is understood to be about 3½ per cent which, with a root chord of almost nine feet, is *less than four inches* maximum physical depth. The radius of the leading edge is 1/64 in., so that the actual edge is about equivalent to the back of a tableknife blade—if the ground crew cannot actually cut themselves on it, it certainly must discourage leaning; hence the issue of felt protective covers. This wing certainly approaches closer to the aerodynamicists experimental "flat plate" than anything else that has flown. In order to obtain a fair stalling behaviour there are full-span leading-edge flaps (droop about 20 degrees) and large plain flaps on the trailing edge—the result approximating to the early pioneer's aerofoils. Even so, the wing lift is small at low speed and is almost certainly greatly aided by that obtainable from the wide fuselage.

Small low aspect-ratio ailerons are fitted to give control at high speed, when it is essential to push the ailerons well up into the main airflow, clear of the separated boundary layer, to obtain controlling forces. The ailerons are inset from the wingtips to allow the drop tanks to be slipped *over* them. Much has been made of these tanks "fitting like gloves", but it is simply that when the wing is little over one inch thick it is easier to do this than to devise a bracket. Incidentally, the ingenuity of the systems' engineers in fitting powerful flap and aileron jacks inside wing thicknesses of a couple of inches without bulges is remarkable.

The tail fin is of low aspect-ratio and nearly as big as a wing—which is curious, since a large fin was one of Kelly Johnson's main gibes at the delta in an S.A.E. lecture three years ago. This large fin and the fact that it is close behind the wing means that when the rudder—tiny though it is—is deflected it has an aileron effect, causing the aeroplane to roll as well as yaw—think of it like the tail fin of a bomb or the feather of an arrow. This cross-coupling of stability and control is an unfortunate feature of supersonic configurations. In order to reduce the yaw/roll effect of the rudder the wings have been given 10 degrees of anhedral to destabilise the aeroplane.

The slab tailplane atop the fin is well clear of downwash and other wing-wake changes, so requiring the minimum trim movements over the F-104's ten-to-one speed range. In transonic and supersonic flight, one degree of incidence change can be worth five or ten degrees of elevator angle, while there is the additional advantage of simplification in using the single surface for trim and control. Again, the compression of the actuating gear into the slender fin is a remarkable feat.

The air brakes are flush-fitting doors at the rear of the fuselage.

The fuselage form is basically a sharply-pointed cylinder (compare it with the Bell X-1) which has been modified by the cockpit bulge and by an upward kink at the rear for ground clearance. A spine from hood to tail keeps the airflow from stalling the fin under adverse yaw conditions. The nose, one understands, was tailored to take the Vulcan multi-barrelled 20-mm. "Gatling gun" and its associated radar sight. The cockpit is pressurised (the pilot also wears a pressure suit) and has extremely compact controls and instrumentation. "Package" equipment (radio, etc.) has been designed so that the F-104 can be rapidly adapted for different missions instead of carrying multi-purpose dead weight.

Having dismissed the idea of a capsule, Lockheed adopted downward ejection to simplify the cockpit hood (it opens for normal ingress) and to ensure clearing the fin at high speed. While removal of the seat "tray" is excellent for ground servicing, this layout means the pilot cannot escape at low altitude—unless he can roll the aeroplane on to its back. Since a forced landing at, say, 250 m.p.h. after a take-off engine cut is unlikely to be successful outside Muroc, this seems a serious drawback. It is not for amusement that runway ejection is being developed on both sides of the Atlantic. it is because most jet fighter accidents occur just after take-off.

Aft of the cockpit every cubic inch of fuselage not occupied by engine and undercarriage must, of necessity, be full of fuel. In the J-65-(Sapphire)-engined prototypes the lateral air scoops were mounted about two inches clear of the fuselage, with shoulder fences, to clear the boundary layer. At Mach 2 a well-designed intake can give more compression to the air than can the compressor—contrariwise, a bad intake can throttle the engine—so its form is vitally important. Unfortunately, an intake that has high efficiency at Mach 2 will be inefficient subsonically and even transonically—hence the elaborate secret-keeping covers screwed over the production F-104A intakes! To achieve full compression in the intake it is essential to generate several normal shockwaves across the flow, thereby both raising the pressure and lowering the speed. It is likely that a feature of this intake is a variable semi-cone to act as a shock former.

F-104 TIME SCALE

1951 Specification and prototype F-104 order.

1953 Seventeen pre-production development YF-104s ordered.*

1954 First flight of XF-104, 7th February
Air firing at end of year.

1955 One prototype lost, late in year.

1956 First production aeroplanes due.

** YF-104s, although all differing in detail were made on production jigs.*

Lockheed pours scorn on area rule, saying that it is unnecessary for the F-104, but the taper behind the intakes is followed by a distinct fuselage bulge at the trailing edge.

The General Electric J-79 turbojet has been designed for supersonic flight and has a single axial compressor with variable-incidence stator blades. This arrangement allows it to be adapted to the pre-compressed airflow at high supersonic speeds. At about Mach 2 at the tropopause, the afterburner will be giving the same power as the turbojet. This is because, due to the air heating of pre-compression, relatively little fuel can be burned in the engine without overheating the turbine, whereas the afterburner can safely reach 1,500°C. Because of the high airspeed, the afterburner operates at greater propulsive efficiency than subsonically.

The undercarriage is a neat little affair, with "weigh-beam" legs which retract forward into the fuselage. The tyres are high pressure (250 or 300 lb./sq. in.) to keep the wheel size down. Anti-skid brakes and a landing 'chute aid in deceleration from the 150 m.p.h. touchdown.

Structurally, the F-104 is simple because one of the keypoints in the specification was insistence upon easy, rapid manufacture. Steel and titanium are largely used to obtain sufficient strength and in areas where skin friction heating and engine radiation combine. The wing is machined to shape from upper and lower units which are bolted together.

To close these notes on what is probably the most remarkable military aeroplane flying today, one would like to comment a little on performance.

First of all, the high wing loading means a take-off speed of 200 m.p.h., requiring nearly a mile of runway for acceleration—plus the same distance for an emergency stop. Once away, the climb is extremely rapid because it is clean and the thrust is some 80 per cent of the take-off weight—in fact, near the tropopause at Mach 2 it exceeds the weight when half the fuel has gone. Zoom climb at altitude, due to the kinetic energy stored by forward speed, takes the F-104 from 30,000 to 70,000 feet in a few seconds says Lockheed.

When flying at its full speed it has ample lift at such heights, for although its lift/drag ratio is poor the speed is high and the thrust is there to maintain the speed. Nevertheless, directional inertia due to the speed is tremendous and one fails to see how manoeuvrability can be good. One imagines the aeroplane having its nose pointed round by the control surfaces and continuing to skid along its original course while the engine thrust gradually pushes it along in the new direction until the original momentum is overcome. On the other hand, throttling back to lower speeds means reducing the lift from the tiny, thin wings and an inevitable loss of ceiling.

Altogether quite a problem in pursuit when the Mach 2 fighter chases the Mach 0.9 bomber at 50,000 feet—as the R.A.F. foresaw when specifying the V-bombers. It seems that the effectiveness of the F-104 *must* depend upon the ability of its gun-and-sight combination to deliver a fatal blow with deadly accuracy in an incredibly brief moment when overtaking its quarry at a closing speed of Mach 1·0.

DATA

Engine . . .	General Electric J-79 with afterburner
*Power . . .	15,000.s.t. at sea-level with a/b
Span, without tip tanks . . .	21 ft. 11 in.
Length, including probe . . .	54 ft. 9 in.
Height . . .	13 ft. 6 in.
Fuselage width, max.	6 ft. approx.
Anhedral . .	10 degrees
*Thickness/chord ratio	3.4 per cent
*Gross weight, max. .	18,000 lb. approx.
*Maximum speed .	Mach 2.2 or 1,400 m.p.h. *in the stratosphere*
Landing speed. .	155 m.p.h.
*Service ceiling . .	70,000 ft.

** Guesstimates based on the more reliable of indiscreet statement by those connected with the aeroplane.*

The well-known sharks-tooth insignia of No. 112 Squadron has now been applied to its Hunters and is well shown in this photograph.

The Journal of a Roving Spotter

SINCE I last wrote on the subject of Bristol Britannias, two new variants have been announced, although only semi-officially. These are, according to American sources, the Series 315, a medium-range version of the long-range 310 intended specifically for Capital Airlines in America, and the Series 400, a further "stretch" of the basic design to have a 10 ft. longer fuselage, a thinner wing and Bristol B.E.25 Orion supercharged turboprops.

The latter variant can be regarded as bridging the gap between the Proteus-engined Britannia 310 and the proposed Orion-engined Type 187, a Britannia re-design. If Britannia sales go as well as is hoped, in particular as a result of the prospective order by Capital Airlines, however, development of the Type 187 may be postponed or even abandoned completely.

The Britannia 101, G-ALBO, is now flying with its third series of engines—Proteus 755s in the outer nacelles. It was initially powered by Proteus 625s and has more recently had Proteus 705s, which are retained in the inboard nacelles. A further change is in view, and if present plans mature we shall see it at the S.B.A.C. show this year with at least one, and perhaps two Bristol Orions.

Other news of engine test-beds is that first flights of the Rolls-Royce R.B.109 Tyne will be made in a Lincoln, followed by a converted Elizabethan (expected to be G-AKRD, at present used for Proteus testing). The latest version of the Rolls-Royce Dart, destined to power the Series 806 and 810 Viscounts, is about to start flight tests in the Dart Dakota used by Rolls-Royce at Hucknall

* * *

I have an interesting note from Avro Canada which lists nine versions of the CF-100 produced to date. They are given as follows (with my own notes added):

Mk. 1. The first two prototypes, Avon powered. First flight 19th January 1950.

Mk. 2. Initial Canadian pre-production batch with Orenda engines. Ten built. First flight 20th June 1951.

Mk. 2T. One dual control training conversion of the Mk. 2 for preliminary handling experience.

Mk. 3. First major production run; seventy built as fighters, Orenda 2 engines. Eight machine guns in ventral tray. Some operational squadrons.

Mk. 3CT. Dual control conversion trainer of the Mk. 3.

Mk. 3D. Dual control training conversion of the Mk. 3. Difference between Mk. 3CT and Mk. 3D is not clear.

Mk. 4A. Initial Mk. 4 production batch, with Orenda 9s and Hughes APG fire-control system in new, bulbous nose; rockets in ventral pack and at wingtips.

Mk. 4B. As Mk. 4 A with Orenda 11 engines.

Mk. 5. Latest production variant for higher altitude operation, with longer span wing, Orenda 14s and larger tailplane. Prototype (which crashed) was known originally as Mk. 4C.

* * *

I wrote last month of some of the latest American experimental aeroplanes with X designations. Oddly enough, news was released shortly after that column was written of another experimental type with a U designation, the Lockheed U-2. The reason for this designation—presumably in the new U.S.A.F. "utility" series which commenced with the U-1 Otter—is obscure. The aeroplane itself, of which about half a dozen have reportedly been built, is intended for general research and weather reconnaissance at high altitudes—in the order, that is, of 50,000 ft.

Powered by a Pratt & Whitney J57 turbojet and having a large-area wing and a "T" tail, the U-2 is still classified as semi-secret and no photographs have been released. Some interesting reports have been circulating however, which suggest that at least one U-2 is flying in England, from the U.S.A.F. base at Lakenheath. Readers in that district, please comment. (See "Letters to the Editor", p. 254.)

* * *

Some interesting details were given recently of the method of operating two lesser-known variants of the Fortress—the QB-17 drone and the DB-17 drone director. Both these types (four of each) are in service with the 3235th Drone Squadron of the U.S.A.F., at the Naval Air Missile Test Centre, Pt. Mugu, California. The drones are used for any flight which may be hazardous to human life—not necessarily target sorties.

Operation of a successful nullo mission (drone operations are so known, from the Latin *nullus*, "not any" or "nothing") involves the use of at least three aeroplanes—one QB-17 and two DB-17s. Each DB-17 requires two pilots, a separate remote control pilot, a flight engineer and two electronics airmen. The QB-17 has a safety crew comprising two pilots, a flight engineer and an electronics airman, who prepare it for flight and disembark immediately prior to take-off.

The safety crew having started the engines of the QB-17 and declared it ready for flight, it is handed over to two ground controllers stationed near the runway; one controller operates the rudder, the other the elevators, and they effect the take-off and set the QB-17 climbing on course.

Control then passes to one of the controller pilots in the DB-17; the second DB-17 is required as a safety precaution in the event of a failure by the first. This controller retains complete control of the drone until its mission is completed—i.e., until it is landed back at the airfield, destroyed as a target, or destroyed deliberately by an internal high-explosive charge or by armed escorting fighters, in the event of a "run-away".

* * *

As I write these notes, I can see, distantly, a Boeing B-47 Stratojet in the circuit for, I imagine, Brize Norton. It is the first I have seen at low altitude for several months, and I can well understand that on first acquaintance, it could be mistaken for a B-52 (see my notes last month). I am glad to have had letters from several readers confirming that the aircraft circuiting over Silverstone was in fact a B-47; on the other hand, no reader seems willing to press his claim of seeing a B-52 over this country.

* * *

At risk of boring the "British only" fans among my readers, I must continue on the subject of American aircraft for a moment, to deal with the assorted colour schemes sported by the Grumman Albatross. The most common version is basically all silver, with yellow wingtips and floats, and a yellow band round the rear fuselage. Aft of the thin band is the M.A.T.S. insignia, and RESCUE is printed across the fin and rudder, denoting the Air Rescue Service. In the Arctic, the wingtips and the tail unit are painted red, the other yellow markings being retained.

Latest Canberra to go into squadron service is the B(I)6; this production example, WT314, is one of the machines issued to No. 213 Squadron.

To prevent ground taxi-ing accidents, "Scotchlite" reflecting tape is applied, on certain SA-16As, on the trailing edge of elevators and rudder tails and round the serial number on the fin.

Some SA-16As used for amphibious training—for instance at Palm Beach—dispense with the yellow bands and RESCUE markings, but retain the M.A.T.S. markings. A few aircraft supplied to the A.N.G. are glossy black all over, with AIR NATIONAL GUARD in red down the fuselage.

The silver aircraft of the U.S. Coast Guard—UF-1G versions—have the yellow bands, but no RESCUE or M.A.T.S. markings, and the national insignia is on the fuselage nose rather than the rear fuselage. The U.S. Navy UF-1 (and UF-1T trainer) is midnight blue all over, with yellow wingtips and yellow fuselage band.

* * *

Hunters continue to reach R.A.F. squadrons at a steady rate, and news is to hand of several units re-equipped. The Sabre has almost completely disappeared from the 2nd T.A.F. in Germany—No. 3 Squadron is, I believe, the last R.A.F. unit to fly this type operationally—and Hunters have been issued instead. Among the squadrons re-equipped are 67, 71 (Eagle), 112 and 130 (Punjab) forming the wing at Geilenkirchen, and 93 at Jever.

As my heading photo shows, No. 112 Squadron has retained, on its Hunters, its unique shark's-tooth marking which dates from the days when it flew Tomahawks and Kittyhawks in the Western Desert. On the Hunter, the shark's tooth looks particularly well, the Hunter's smooth nose looking much more like a shark's snout than did the gaping Sabre intake of the squadron's previous equipment.

It is now known that No. 88 Squadron will be the first to fly Canberra B(I)8s with 2nd T.A.F. The squadron has previous experience in intruder operations with Blenheims and Bostons during the last war, but has spent most of the intervening period flying Sunderlands in the Far East, including Korea. Nearer home, the Sabre squadrons of Fighter Command at Linton-on-Ouse, numbers 66 and 92, have now traded in their aircraft for Hunters; No. 92 carries its red-and-yellow check marking on the nose, while the white rectangles of No. 66, outlined in blue, are painted each side of the fuselage roundel.

* * *

A reader has asked me to note the variants of the English Electric Canberra as an *aide-mémoire* this month. A lengthy task, but I hope the following notes are of value. (The information on engine variants in the different marks, incidentally, comes from published sources; such information is officially "classified".)

Canberra B. Mk. 1. Designed by W. E. W. Petter to B.3/45 as English Electric EE.A1. Two-seat, high-altitude bomber with radar bomb-sight; no visual bomb aiming. Four prototypes; VN799 (flown 13th May 1949) with Avon R.A.2, VN828 and VN850 with Avons and VN813 (flown 9th November 1949) with two Nenes. VN828 modified by Boulton Paul in 1955 to have Mk. 8-type cockpit canopy and a nose-mounted radar for trials at R.R.E. Defford, VN813 used as test-bed for de Havilland Spectre rocket motor in bomb-bay.

Canberra B. Mk. 2. Three-seat, high-altitude bomber, with provision for visual bomb aiming. Avon R.A.3. Two prototypes, VX165 and VX169. Production commenced with WD899, deliveries beginning in January 1951 to first squadron No. 101 at Binbrook. WD932 and WD940 to U.S.A. as prototypes for Martin B-57; WD932 with Olympus 100, 101; WD933 with Sapphire A.S.Sa.6, A.S.Sa. 7; WD943, Avons with re-heat; WD930, Avon R.A.14; WV898, Sapphires with re-heat. Exports to Australia (two) and Venezuela (ten).

Canberra P.R.3. Two-seat photographic reconnaissance version of B. Mk. 2. Two Avon R.A.3. Transparent nose cap, no optical flat for bomb aimer. Prototype VX185. Production deliveries commenced WE135, to No. 541 Squadron initially at Benson.

Canberra T.4. Three/four-seat training version of B. Mk. 2 with dual control. Two Avons. "Solid" nosecap, no bomb aimer. Prototype WN467; production deliveries commencing WE188, to No. 231 O.C.U. at Bassingbourne.

Canberra B. Mk. 5. Two-seat, target marker pathfinder. Two Avons. Special radar equipment in modified nose. Prototype only VX185 (P.R. Mk. 3 converted); no production.

Canberra B. Mk. 6. Three-seat, high altitude bomber. Two Avons. New production series to replace B. Mk. 2. More fuel etc. Production deliveries commencing WJ764; first squadron, No. 101, equipped 1954. Exports to France, Chile.

Canberra B(I). Mk. 6. Three-seat, night intruder version of Canberra B.6, with four 20-mm. cannon in pack in bomb-bay for ground attack; provision for underwing bombs. One squadron only, No. 213, formed in 2nd T.A.F. 1956. WT serials.

Canberra P.R. 7. Three-seat, photographic reconnaissance version of B. Mk. 6, with equivalent modifications. Two Avons. Production commenced WH773.

Canberra B(I). Mk. 8. Two-seat, ground-attack and night-intruder variant. Two Avon. Re-modelled, off-set cockpit; gun pack in bomb-bay and underwing stores. Prototype VX185 (P.R. Mk. 3 converted) first flown on 23rd July 1954. Production commencing WT326, for initial deliveries to No. 88 Squadron, 1956. Eight for Peru.

Canberra P.R. Mk. 9. High altitude, two-seat, photographic reconnaissance. Longer wing, increased chord on centre section, bigger tailplane, Mk. 8-type cockpit on production aircraft. Two Avon 206. Prototype WH793 (Mk. 7 converted). Production commencing XH129 for deliveries 1956.

Canberra B. Mk. 20. Production of B. Mk. 2 in Australia; forty-eight for the R.A.A.F. with Avon 109. First flown 29th May 1953.

For its appearance at the First Round national air races, held at Yeadon during May, the little Chilton monoplane G-AFSV had been re-engined with a 60-h.p. Mikron engine, instead of a 44-h.p. Train.

"*Aeroscribe*", *June* 1956

Did You Know . . . ?

Spot Aviation News from all over the World

GREAT BRITAIN. An Indian order for Canberras is now certain. Indian reports place the number involved at sixty.

● Kurt Tank has been appointed by the Indian Government to a post with Hindustan Aircraft, as from 1st June. He will remain in India three to five years and work on advanced projects including a fighter. It is not known whether this will affect Hindustan licence-production of the Folland Gnat.

● One of the R.C.A.F. Comet 1s has now been flown to Hatfield for modifications, and the first of the Air France Comet 1s to be purchased by the M.O.S. has been given the manufacturers' registration G-5-23.

● The Saro SR.53 rocket plus jet fighter is believed to be in the lightweight category, and of equal interest to both R.A.F. and Fleet Air Arm.

● About seventeen Beverleys have now been completed by Blackburn and General Aircraft at Brough.

● A development contract is said to have been placed with Avro for a 1,000-m.p.h. bomber for R.A.F. service in about six years time. It will carry anti-missile equipment.

CANADA. Sabre 6s from Canadair-Montreal are being ferried to Europe by No. 1 Oversea Ferry Unit, R.C.A.F., to re-equip eight of the squadrons of No. 1 Air Division. The Mk. 6 has the Orenda 14 in place of the 10 in the Mk. 5, and a "hard" leading edge to the wing. It is in effect an F-86E with F-86F wing. Delivery of the thirty-four Sabres bought by South Africa is expected soon. Nearly 1,500 Sabres have been built by Canadair, 227 in 1955. One F-86 is at Uplands, Ottawa, testing a "wasp-waist".

● The CS2F-1 will equip H.M.C.S. *Bonaventure* and may be delivered to NATO. Total ordered has been quoted as one hundred, but one sub-contractor has orders for 240 units, and 400 Pratt & Whitney R-1820 Cyclones are on order at Canadian P. & W. Ltd. Twenty engines have been delivered to date.

● Production figures given recently for Canadian products include over eighty-six DHC-3 Otters. Ninety are on order for the U.S. Army as the U-1A, and twelve at least have been delivered to Engineer Groups. Six have been delivered to the U.S. Navy (UC-1). These were actually R.C.A.F. aircraft, as those scheduled for the U.S.N. were held up by the strike.

● Over 500 L-20s are on order, and more than 875 DHC-2s of all types have been delivered.

● The first of a development batch of six CF-105s is expected from the Malton, Ontario, plant in the summer of next year. This delta Mach 2 fighter is to be powered by the J-57, but later machines will have the Orenda PS-13 of around 18,000 to 20,000-lb. thrust. All-up weight of the machine will be 50/60,000 lb., ceiling above 60,000 ft., and range about 2,500 miles, according to reports.

● The Orenda PS-13 will be flight-tested under the rear fuselage of a B-47B which is on two-year loan to the R.C.A.F. Modifications will be made at Cartierville by Canadair. Installation is slung because the PS-13 is too big to go in the bomb bay. Unofficially rated at 18,000-lb. thrust the first runs of the new engine were made last year at three-quarter thrust. In addition to the B-47, Orenda operate two CF-100s and two Sabres. All their previous flight-test aircraft were destroyed in a hangar fire in 1955.

● DHC-4 is the designation of a two-engined utility aircraft under consideration by D.H. Canada, according to Canadian reports.

● Over 450 CF-100 Mk. 4s out of the order for 600 have now been delivered, in addition to the two prototypes and eighty aircraft of earlier Marks. Mk. 4 production started in 1953, and reached a peak of twenty-five aircraft a month, now cut to ten to stretch the work until the CF-105 appears. Nine home defence squadrons are equipped with the CF-100 and four squadrons in No. 1 Air Division are to receive it this year. Their aircraft will probably be those allotted to, but later removed from, auxiliary squadrons.

● Design studies and mock-ups have been made for a jet trainer to replace the T-33 Silver Star. About 550 T-33ANs have been built at Montreal for R.C.N., Greece and Turkey. The original contract, since augmented, called for 576 aircraft.

● The Canadair CL-28, the maritime Britannia, is scheduled for delivery early in 1957, and completion of the first production aircraft is dated late this year. A total of fifty will probably be ordered, mostly in contract batches of twelve at a time. The first order was for thirteen, and two blocks of twelve have been ordered since then. All fifty are to be finished by 1961. Design studies were prepared for a projected transport version, the CL-44.

● The D.H. Canada CS2F-1 (Sentinel) is in production at Downsview. Deliveries, delayed by strikes, are now scheduled for September. Four or five are to be built this year.

FRANCE. Delivery has been made of the first six of the order for Vertol H-21C helicopters. Most of this first delivery are said to be for use in Morocco. The H-21C and Sikorsky 58 are being evaluated by the French Air Force for licensed production of one by SNCASO or SNCASE respectively. They will be replaced eventually by the SE-316, of which two prototypes are under construction.

● According to Breguet, their Br-940 Integral STOL aircraft, two prototypes of which are expected to fly in the summer of next year, is to be considered by the U.S. Army. Other news from Breguet includes contracts for fifteen Br-765s, a military version of the Provence, of which Air France operate twelve, and three prototypes each of the Br-1100 twin-jet fighter and the Br-1001 Taon. The French Navy have ordered five Br-1050 for evaluation.

● Further details are to hand of new Dassault aircraft (*D.Y.K., May* 1956): Three prototypes of the Mystère 22, powered by two Turboméca Gazebo, for the French Air Force, and three Mystère 26s with the Bristol Orpheus for N.A.T.O. One Mystère 22 will be a naval version. In addition, they have under construction at Bordeaux the Mystère 24, the Cavalier, which is powered by an SNECMA Atar 101 E-3. This private venture will have a span of 29 ft. 2 in., a sweepback of 45 degrees and an all-up weight of 12,125 lb. The undercarriage is designed specially for use on unprepared grass strips.

U.S.A. The F5D is now undergoing flight trials at Edwards A.F.B. This new Navy fighter differs from its predecessor, the F4D Skyray, in having a longer fuselage, bigger fin and 12,000-lb. thrust General Electric J79 in place of the 10,000-lb. Pratt & Whitney J57.

● The F4D has been delivered to squadrons of the Atlantic and Pacific fleets and the Marines. It will serve aboard the larger carriers of the U.S. Navy, the *Forrestal*, *Antietam* and *Midway* classes. An operational ceiling of over 55,000 ft. has been claimed for this aircraft.

● The Redstone missile developed for the U.S. Army has been renamed Jupiter A. With a 200-mile range, Redstone is the short-range half of Project Jupiter, an IRBM (Intermediate Range Ballistic Missile) sponsored by the Army and Navy. Jupiter B will have a range of 1,500 miles.

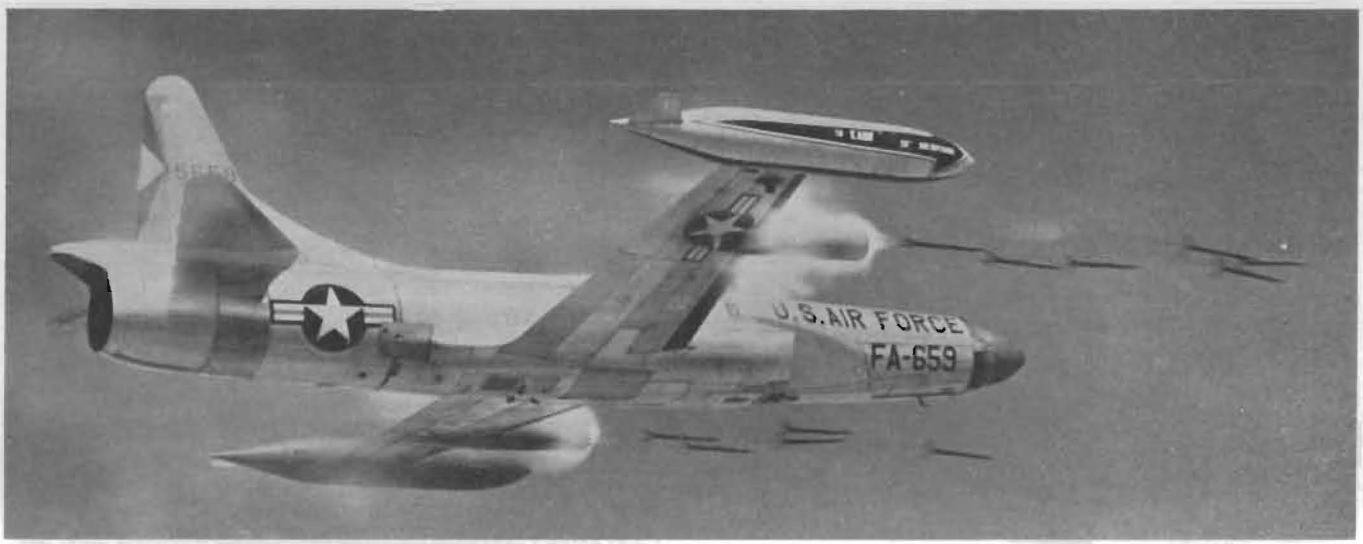
● The latest unit in the X category of research vehicles to be made public is the Lockheed X-17, a project for a ballistic research missile powered by a three-stage solid fuel rocket.

● Latest information available on the Republic F-103 (*D.Y.K., June* 1956) indicates that it will be fitted with the new Curtiss-Wright dual-cycle engine, which combines a turbojet and ramjet in one powerplant, and has been bench tested.

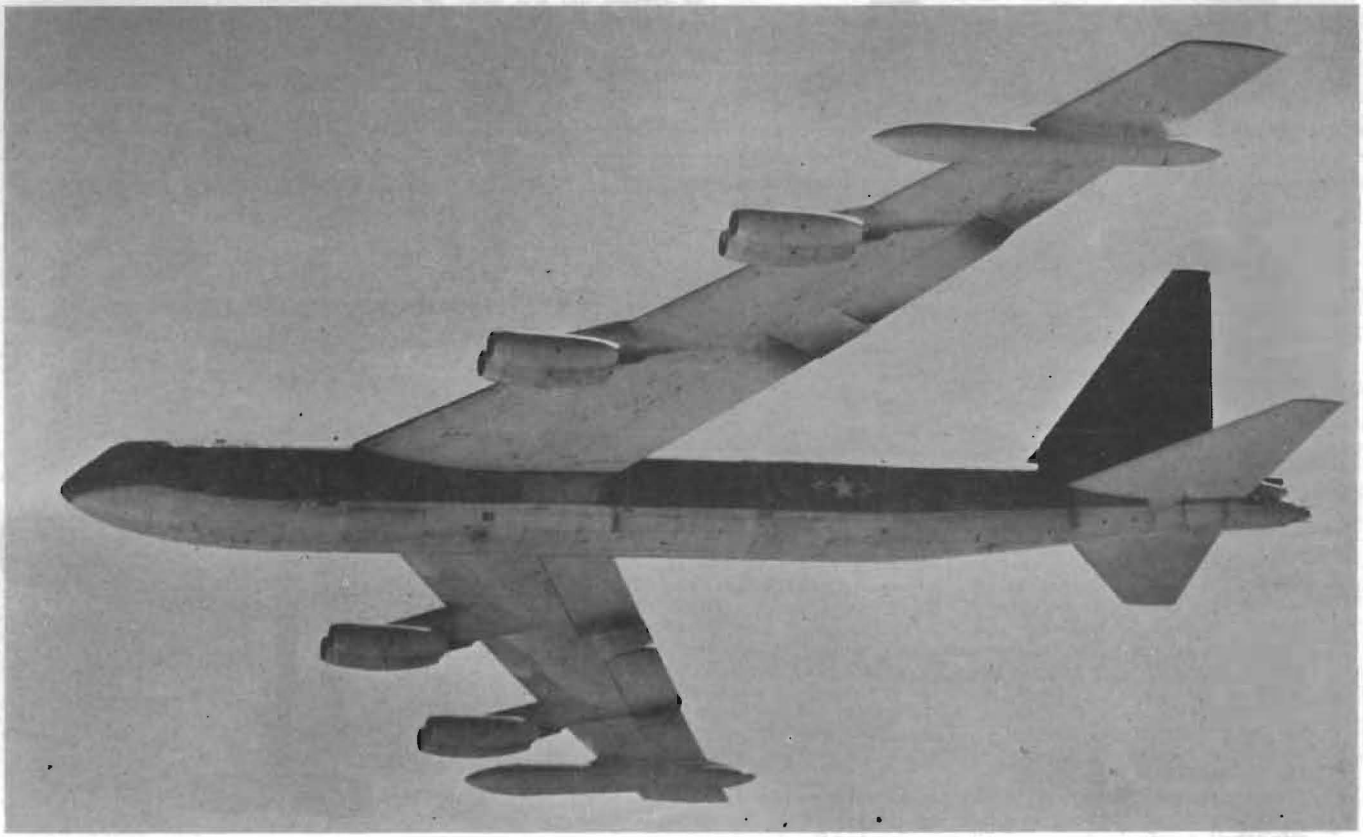
● North American, Northrop and Republic have all been hit by the U.S.A.F. decision to cancel development contracts for a long-range interceptor and fighter/bomber. The reason given is lack of funds for research and development in the current budget. A medium-range (800 miles) interceptor project which is under consideration by several companies, is unaffected.

● On trial on the U.S.S. *Forrestal* are an A3D and FJ-4 Fury from the N.A.T.C. at Patuxent River, resplendent in their new coats of "dull gull gray and glossy white".

● Latest development of Nike II now in service is Nike B, said to be capable of destroying any known or contemplated enemy bomber. Between four and six Nike batteries, four rocket-launchers to a battery, are to be installed at Kaiserslauten, Germany.

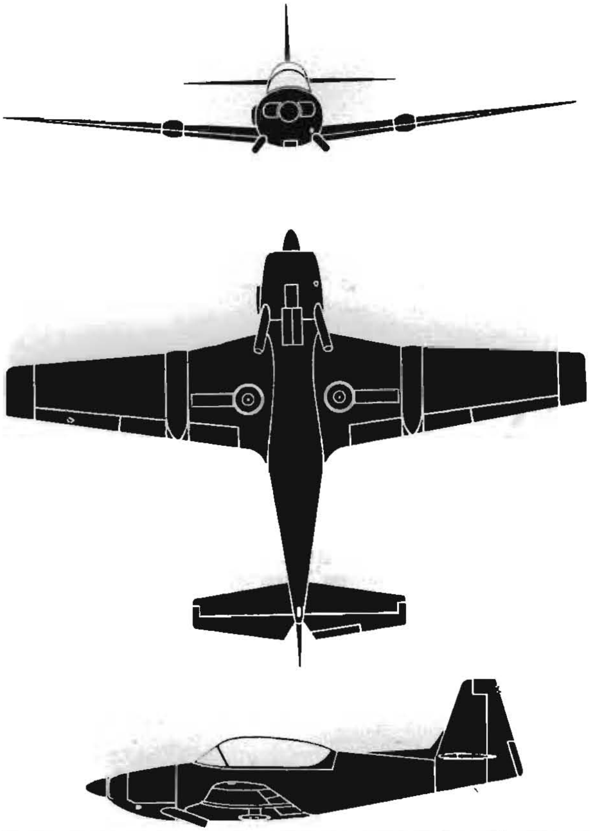


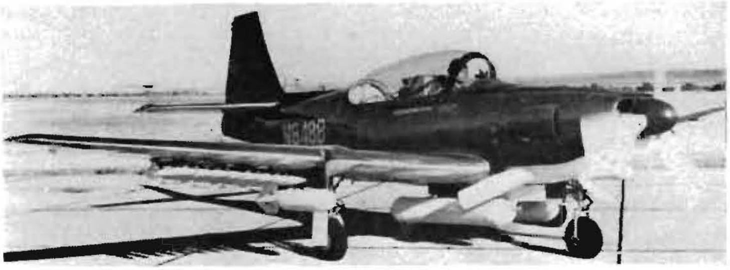
Lockheed F-94C Starfire—The two-seat F-94C is the first jet fighter to employ a missiles-only armament—forty-eight folding-fin 2.75-in. Mighty Mouse rockets. This view of a 26th Air Division (Air Defence Command) F-94C—U.S.A.F. serial 51-5659—shows two salvoes (six each out of the total twenty-four) at the moment of leaving the wing pods. The remaining twenty-four air-to-air rockets are housed in four groups of six around the nose. The F-94C Starfire is one of the chief all-weather "immediate readiness" interceptors guarding major cities in the United States. Delivery of the 279th Starfire in February 1954 completed the U.S.A.F. contract As the shape suggests, the F-94 was a direct development of the F-80/T-33A Shooting Star series. With a loaded weight of 27,000 lb. the F-94C powered by an after-burning 8,300-lb. s.t. P. & W. J48-P-5, has a maximum speed of 646 m.p.h., ceiling of 48,500 ft. and range of 1,600 miles. Span, 38 ft. 10½ in., length, 41 ft. 5½ in.



Boeing B-52C Stratofortress—First production B-52C-1-BO (U.S.A.F. serial 53-400) banks over to show off the new 40-ft. long auxiliary fuel tanks which are in keeping with the giant proportions of the Stratofortress. Span is 185 ft.; length 156 ft. 6 in.; and wing area, 4,000 sq.-ft. The loaded weight is over 400,000 lb., and the eight 10,900-lb. s.t. P. & W. J57-P15s permit a maximum speed of 650 m.p.h. and cruising altitude in excess of 50,000 ft. To date the U.S.A.F. Strategic Air Command has received some eighty of the 500 Stratofortresses scheduled to be built before the close of 1957. The first S.A.C. Combat Wing to be equipped with B-52s (B-52As and B-52Bs) is the 93rd Bombardment Wing (Heavy). Many of the B-series will operate as reconnaissance-bomber RB-52Bs. Current production is concentrated on the longer range B-52C-BO (BO—Boeing, Seattle) and the similar B-52D-BW (BW—Boeing, Wichita, Kansas). Range varies from 3,000 miles with 75,000-lb. bomb load (6,000 miles with 25,000 lb.) to the RB-52's 8,500 miles. First flight (YB-52—serial 49-231) was on 15th April, 1952. Present cost of a B-52 is in excess of £2¾ million.

TEMCO MODEL 58



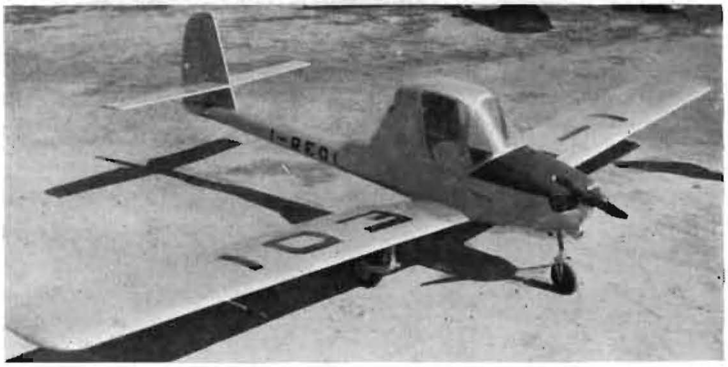


The Temco 58 has been designed as a two-seater primary trainer with easy conversion to a secondary role as an armament training machine. It is a private venture of the company, and they state that it is intended mainly for sale to military air forces abroad. The aircraft is fully aerobatic, and the transformation from unarmed primary training to weapons instruction can be made in less than twenty-four hours.

Salient features: Construction is all metal and a retractable tricycle undercarriage is fitted. The one-piece bubble canopy is power-operated. Complete night-flying instruments are fitted. Considerable attention has been paid to ease of maintenance, and many components are interchangeable. Many major sections of the aircraft can be replaced quickly in the field and specialised equipment is not needed for this purpose. The comprehensive armament installation consists of two machine guns, either .30 or .50 in., together with two Napalm bombs, two 100-lb. general-purpose bombs, and sixteen 8-cm. rockets.

Data: Manufacturer: Temco Aircraft Corporation, Dallas, Texas. Powerplant: one Lycoming GSO-480-A1A6 piston engine of 340 h.p. driving 7-ft. diameter constant-speed three-bladed airscrew. Accommodation: pilot and pupil. Dimensions: span 33 ft. 2¾ in.; length 25 ft. 10 in.; height 9 ft. 10 in. Weights: gross 2,993 lb.; empty 2,270 lb.; useful load 723 lb. Performance: maximum speed 185 kts.; cruising speed 174 kts.; economical cruising speed 137 kts.; service ceiling over 25,000 ft.; range at economical cruising speed 485 nautical miles. Fuel: 50 gallons.

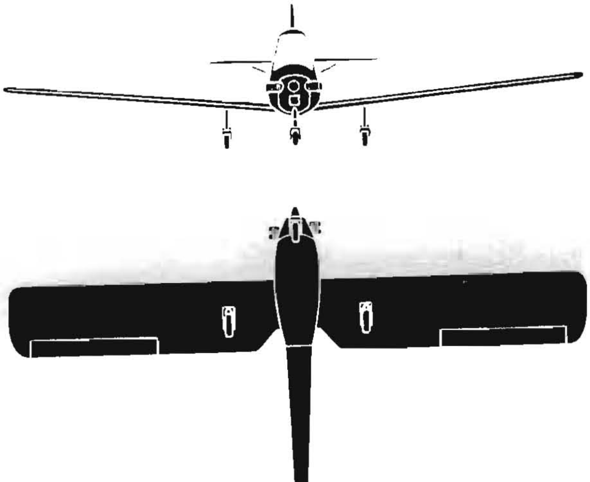
PARTENAVIA P-53 AEROSCOOTER



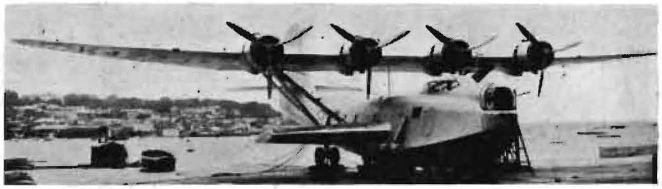
More than once a well-known pilot has designed and sometimes had built for himself his ideal aeroplane. In most cases the idea does not get very far. The Aeroscooter M.d.B., however, is an exception. It was designed by Dot.-Ing. Luigi Pascale, technical director of Partenavia, expressly for Mario de Bernardi, winner of last year's d'Annunzio Trophy on a Partenavia P-55 Tornado. The Aeroscooter must represent quite a change from some of Colonel de Bernardi's past mounts; in 1926 he brought the Schneider Trophy home to Italy on a Macchi M-39 at 246.5 m.p.h. The machine was demonstrated recently at Naples to a group of technicians and officials, including the Minister for Air Defence.

Salient features: Designated P-53 by Partenavia, the Aeroscooter is constructed throughout of metal, and represents the minimum safe structure required to unite pilot, engine and flying surfaces.

Data: Manufacturer: Fartenavia S.p.A., via Tasso 480, Naples. Powerplant: one Ambrosini P-25 piston engine of 22 h.p. driving a two-blade wooden airscrew. Later machines will be fitted with more powerful engines of 35-40 h.p. Accommodation: pilot. Dimensions: span 27 ft. 2 in.; length 16 ft. 9 in.; height 5 ft. 7 in. Weights: loaded 551 lb.; empty 330 lb. Performance: maximum speed 93 m.p.h.; cruising speed 74 m.p.h.; stalling speed 37 m.p.h.; service ceiling 11,500 ft.



SAUNDERS-ROE A.33

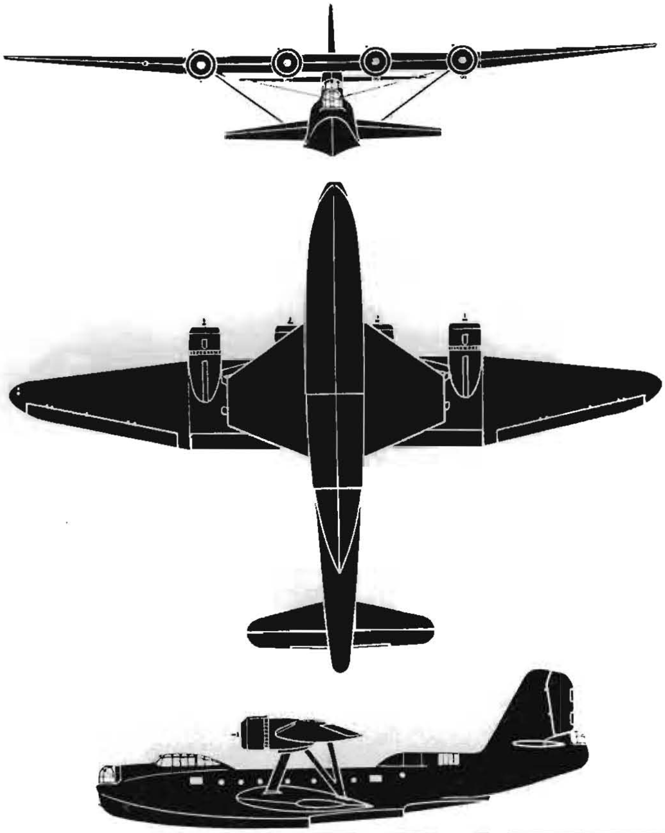


A British flying-boat which has long intrigued students of aircraft development is the little-known Saunders-Roe A.33 of the late 1930s. For the first time, *Air Pictorial* publishes a three-view drawing together with a number of hitherto unpublicised details.

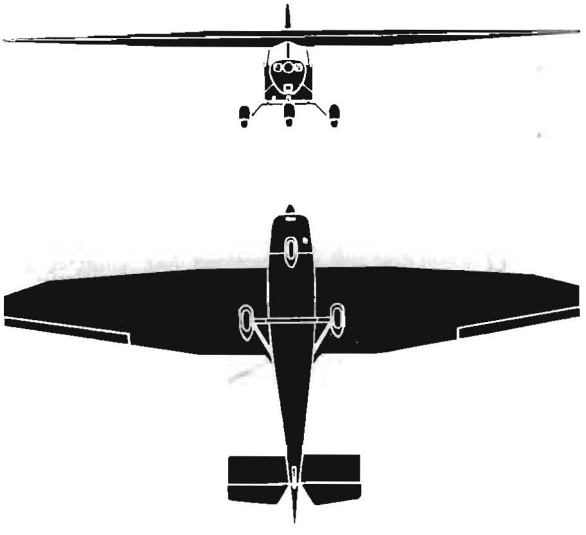
The Saro A.33 was built to the same Air Ministry Specification (R.2/33) as the Short Sunderland—calling for a long-range reconnaissance and patrol flying-boat. The contract for one prototype (K4773) was placed in 1934–35 and construction started late in 1936. The A.33 was completed in September 1938 and the first taxi-ing trials were carried out on 10th, 11th and 12th October. On 14th October the A.33 was airborne for the first time, at an all-up-weight of 31,000 lb. After some half a dozen flights, K4773 was seriously damaged through "porpoising" during high-speed taxi-ing in the Solent. As the result of a heavy hull/water impact, the fabric-covered, all-metal wing failed in torsion at a position in line with the inner starboard Perseus. The starboard wing then twisted about the single main spar and the starboard inner airscrew ripped into the hull and sponson, while detached structure damaged the tail assembly. As the damage was above the water-line, the A.33 did not sink and it was towed back to the East Cowes slipway.

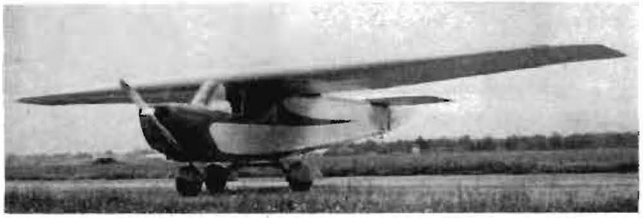
This unique British example of the sponson flying-boat was not repaired and Saro concentrated on the twin-engined A.36 Lerwick.

The A.33 was powered by four 830-h.p. Bristol Perseus XII sleeve-valve radial engines and had a design max. speed of 200 m.p.h. at sea-level. Gross weight (design) was 41,500 lb., and on at least one occasion the A.33 was flown at 35,000 lb. Nose and tail power-operated turrets were to have been fitted, while pillar-mounted single .303-in. Vickers K machine guns were to be fitted each side of the enclosed dorsal hatchway just forward of the single fin. The wing was supported by massive N-struts attached to the metal sponsons and by V-struts attached to the hull. *Other data:* Not known.



DITTMAR HD 153 MOTOR-MÖVE





Now ready for delivery at a price—in Germany—of about £1,200, the HD-153 Motor Möve (Motor Gull) is the newest entrant in the light- and roadable-aircraft field. Flugkapitan Heini Dittmar, the designer, was well known before the war as an international Gliding champion. The prototype, D-EBEF, is flying successfully. Preparations for road-towing are simplicity itself; two bolts are withdrawn to release the tail controls, the wing, rudder and tailplane are stowed on top of the fuselage and bolted down, and a dolly with ball coupling is attached to the undercarriage.

Salient features: The fuselage is of wood, plywood covered, with the rear top decking detachable. An entrance door on the left side gives access to the two side-by-side seats, one of which comes out if an extra tank is fitted. Baggage room is at rear of cabin. Dual control is fitted. The wooden wing has a one-piece spar with torsion-box plywood leading edge, and lift spoilers on the top surfaces. The tail unit is of similar construction, the balanced rudder being fabric covered. Spring tabs are fitted to the elevators. A fixed spatted tricycle undercarriage has nose-wheel steering direct from a hand lever in the cabin.

Data: Manufacturer: Heini Dittmar—marketed by Carlsen-Aero of Rothenburg. Powerplant: one 65-h.p. Continental, or one 85-h.p. Continental, performance figures in brackets where different. Accommodation: two. Dimensions: span 39 ft. 4 in.; length 21 ft. 4 in.; height 5 ft. 3 in.; wing area 197 sq. ft. Weights: maximum 1,542 lb.; empty 815½ lb.; load 736 lb. Performance: top speed 102.3 m.p.h. (124 m.p.h.); cruising speed 89.5 m.p.h. (105.4 m.p.h.); landing speed 37.2 m.p.h. Climb to 3,280 ft. in 7 min. Tankage 16½ gallons giving 4½ hours endurance. With 44 gallon (extra tank), endurance is 13 hours. Consumption 24 m.p.g. Propellor diameter 5.9 ft.

THE FAIREY DELTA 2

is powered by a

ROLLS-ROYCE

AVON

turbo jet engine

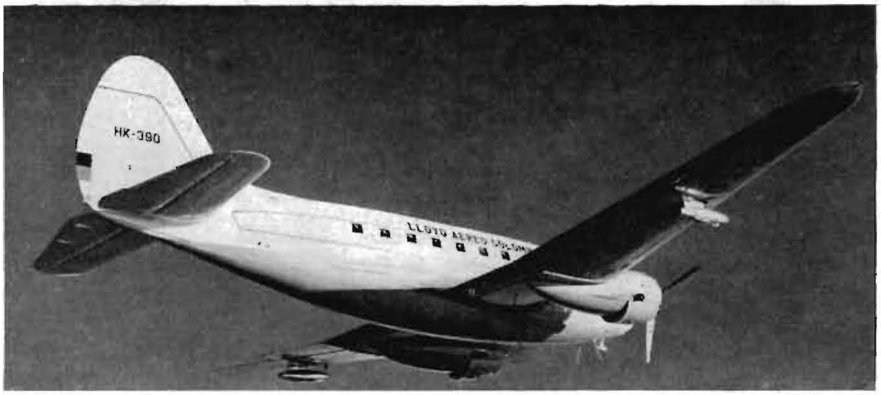
ROLLS-ROYCE LIMITED, DERBY, ENGLAND.

THE CURTISS CW-20T

New-Life Commandos

By

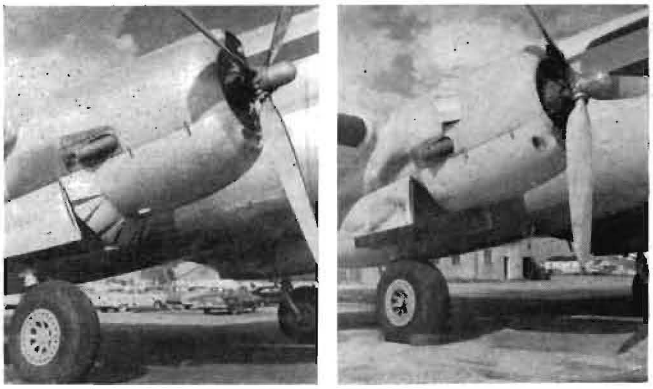
HAROLD G. MARTIN



This fine view of HK-390, the first of three Lloyd Aereo Colombiana Palas-assisted C-46F Commandos, shows the starboard three-blader feathered and the diminutive size of the pod-mounted Palas turbojets. The radial R-2800-51s have the old-style ventral cooling gills just forward of the step-up to the main undercarriage doors.

RECENTLY the Curtiss C-46 Commando was granted a new lease of life when the C.A.A. (U.S. equivalent to the Air Registration Board) gave their blessing to the remodelled CW-20T.

The CW-20T is the new designation which will apply to all ex-U.S.A.F. C-46A to 'F Commandos brought up to the recently-agreed standard of the Transport Category Certification. The modifications include re-engining (plus new style cowlings), adoption of the redesigned C-46F tail assembly and the provision for forty-five to fifty-five seats in place of the average thirty seats. Other improvements include a greater a.u.w., increased from average 45,000 lb. to 47,640 lb.; new escape hatches and improved fire detection and supression and stainless steel firewalls and accessory protection. The extra 200 h.p. of the 2,100-h.p. Pratt & Whitney R-2800-C (in place of 2,000-h.p. Pratt & Whitney R-2800-51/'75 Double Wasps) permits a cruising range of 1,635 miles at 225 m.p.h. at 85 per cent take-off power. The greatest advantage is the ability to operate at gross weight from airports up to 8,000 feet above sea-level. Many such fields are to be found in the South American states.



(*Left*) The "old" ventral cooling gills of the R-2800-51 as on the C-46F and (*right*) the "new" dorsal gills and additional "eye" intakes, one each side of the larger Convair-type oil cooler intake. The upper intake (carburettor) is also larger for the R-2800-C engine

The reworking of the Commando is the culmination of two years of study and application (including nine months prototype flying) on the part of two Florida repair, maintenance and conversion companies resident at Miami International Airport. The chief engineers of Air Carriers & Services, Inc., and L. B. Smith Aircraft Corpn., Messrs. S. Tao and E. L. Thomas respectively were responsible for the conversion. There are about 200 C-46s in the U.S.A. and others are being ferried back every week from the Middle and Far East.

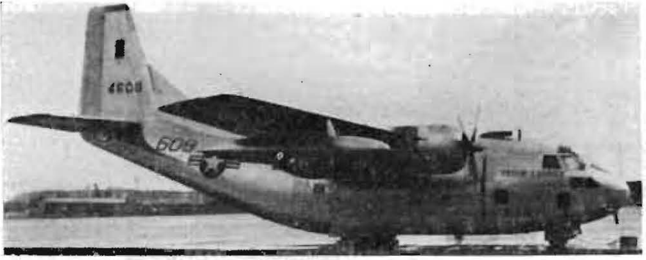
L. B. Smith Aircraft has also been responsible for the installation of two pod-mounted Turboméca Palas turbines on the three C-46Fs (Pratt & Whitney R-2800-51s) now being operated by Lloyd Aereo Colombiana. At La Paz Airport, Bolivia, an invited assembly were impressed by the single engine take-off and climb (one 2,000-h.p. -51 and two 350-lb. s.t. Palas turbojets). La Paz is 13,000 feet above sea-level, the highest airport in the world. These "Super 46s" are the first French jet-powered transports to go into scheduled service in the Americas. The Palas jets use the same 100/130 octane fuel as the R-2800s. Seating is for forty-four passengers.

Originally known as the Curtiss-Wright CW-20, the forerunner of the U.S.A.A.F. C-46 Commando was first flown at St. Louis in 1940 as a thirty-six-seater with a crew of five. Apart from being the largest two-motor transport ever built (span, 108 ft.) the sole CW-20 was the first all-metal airliner to incorporate a "double bubble" fuselage cross-section, now so familiar on the Boeing Stratocruiser, and soon to be seen on the Vickers Vanguard.

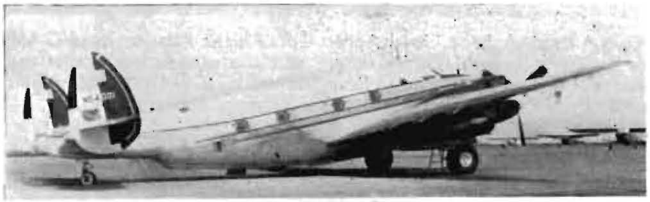
The general shape of the Commando has altered little over the years although the prototype, which later became B.O.A.C.'s "St. Louis" (G-AGDI in 1941) was first flown with a twin tail assembly something like that of the French SO 30P Bretagne. The U.S.A.A.F. bought the prototype and gave it the C-55 designation. One version of the C-46, the XC-46C, became the XC-113.

Rare registration C-46F with a hatchway on the starboard rear fuselage and the old ventral gills, HI-14 is one of four C-46s belonging to Compania Dominicana de Aviacion C. por A.

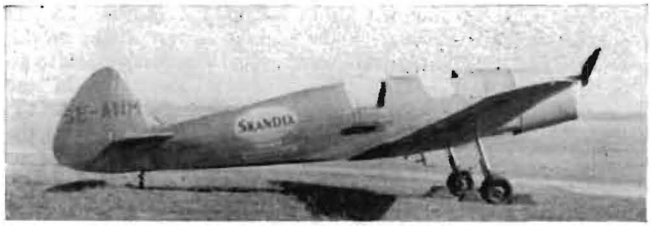
Ready for an American or overseas buyer, N1381N is the smartly-painted, remodelled CW-20T with the new gill-position R-2800-Cs and the multi-colour paint finish.



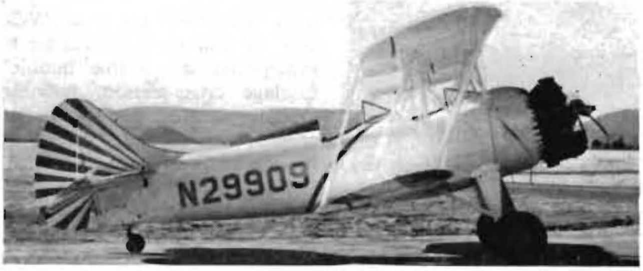
FIRST EUROPEAN C-123B-FA landing in Europe was on 20th March at Prestwick, en route for France. Note the underwing extra-range fuel tanks. Now called the Fairchild Provider, 165 C-123B-FAs are being delivered to Combat Cargo squadrons of Tactical Air Command. Full U.S.A.F. serial is 54-608.



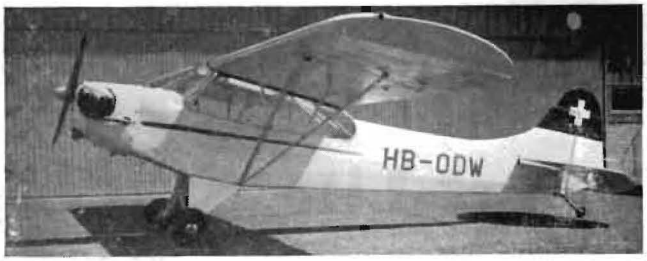
EXECUTIVE VENTURA N64001 is one of a small number of U.S.-based, civilianised Lockheed-Vega Model 37s. Current Aerojet-General Corpn. (Azusa, Calif.) tests improve ex-U.S.N. PV-1 take-off performance by 50 per cent when two 1,000-lb. s.t. 15KS-1000-A1 bootle units are fitted under fuselage. *(Photo: W. T. Larkins, Concord.)*



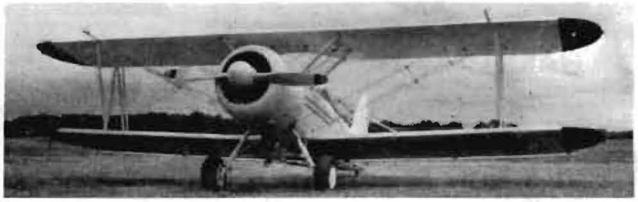
PRE-WAR S.A.I. KZ-II SPORT SE-ANM is now owned by Malmö Aero Club. Fuselage advertises well-known Swedish insurance company. Power is 105-h.p. Hirth H.M. 504A-II. Danish clubs now have several ex-R.D.A.F. post-war KZ-IITs. *(Photo: F. K. Fogh-Nielsen, Copenhagen S, Denmark.)*



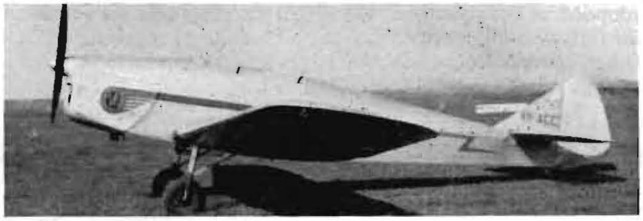
WACO MODEL UPF-7 of 1939 has new large U.S. registration letters. Jazz tail markings indicate former use of this ex-U.S.A.A.C. PT-14 as air shows' stunt biplane. Power is 225-h.p. Continental R-670-3. *(Photo: Frank C. Hartman, Charlottesville, Va., U.S.A.)*



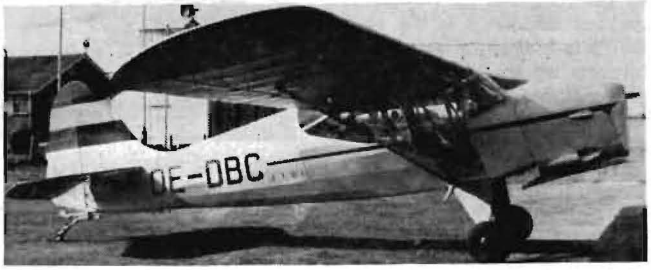
SWISS-MODIFIED CUB HB-ODW is a Model J3C-65 Cub Special (c/n. 12542, ex-U.S.A.A.F. 44-80246), tandem seater, powered by a 65-h.p. Continental A-65. Novelty: revised rear-vision canopy, slimmer rear fuselage and curved-fillet fin. *(Photo: E. W. Wagner, Wembley, Middx.)*



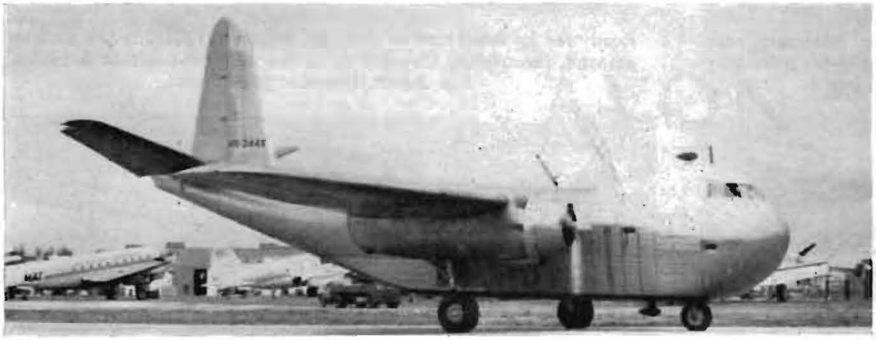
COWLED CANARY crop-duster is one of more than two hundred Naval Aircraft Factory N3N-3s now declared surplus. N45167 is operated by Air Spray Inc., of Hales Corner, Wis. Cowling suggests Jacobs or P. & W. Normal N3N power is 220-h.p. N.A.F. (Wright) R-760-8. *(Photo: Robert P. Straub, Amelia, Ohio, U.S.A.)*



NON-TROUSERED MILES M.2F VH-ACC is an original 1934 Hawk Major, rebuilt from a wreck and now flown from Moorabbin. On current British Register—G-ADMW (M.2H; c/n. 177) and G-ADWT (M.2W; c/n. 215). *(Photo: E. A. Coates, Camberwell, E.6, Victoria, Australia.)*



AUSTRIAN AUTOCAR OE-DBC is a J/5P, seating four. Photographed recently at Southend. Will be used for glider-towing—note bar above tailwheel. Tail has Austrian national markings of red, white, red. Engine is 145-h.p. D.H. Gipsy Major 10, Mk. 2.



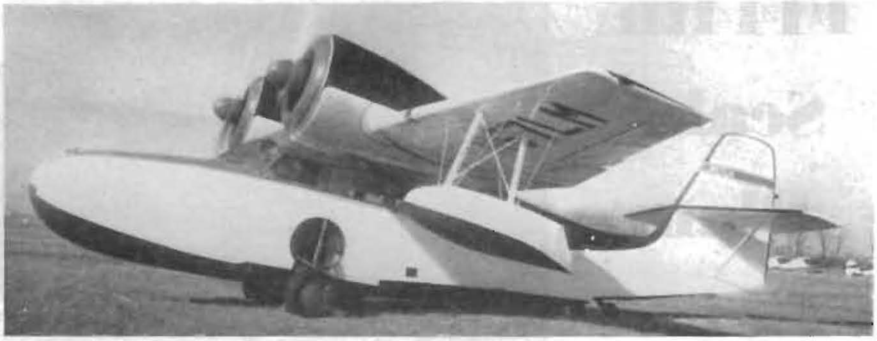
LAST BUDD CONESTOGA

Pictured leaving Miami International Airport recently, bound for Bogota, Colombia, is the last airworthy example of the stainless steel Budd Model RB-1 ex-U.S.N. JRB-3 Conestoga. Formerly used for cargo duties by "Q" Airways (Aerovias "Q" S.A.) of Cuba, CU-C-497 has now become HK-344X—"X" indicates Restricted Category. New owners are AEREO-LLANO of Colombia. Power is two 1,200-h.p. P. & W. R-1830-92s (as C-47 Dakota). Compare with C-123B-FA Provider configuration above. In background are C-46 Commandos of Riddle Airlines and Meteor Air Transport. *(Photo: Hal G. Martin, Miami, Fla.)*

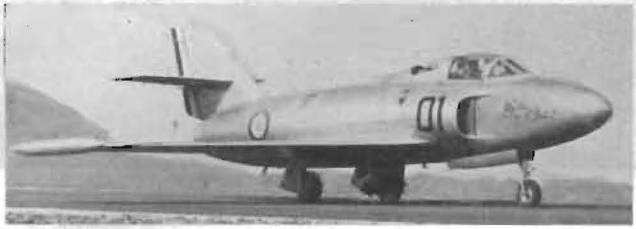
AIR PICTORIAL'S

PHOTO REVIEW

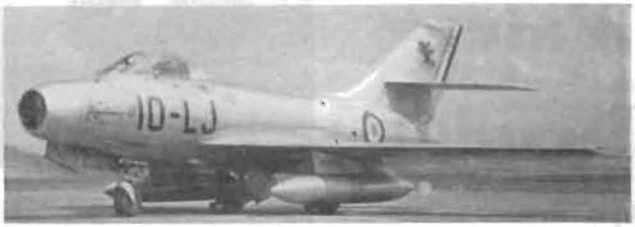
Another round-up of familiar and not-so-familiar shapes, including the first radial-engined Widgeon (Super Scan) and the last remaining Budd Conestoga.



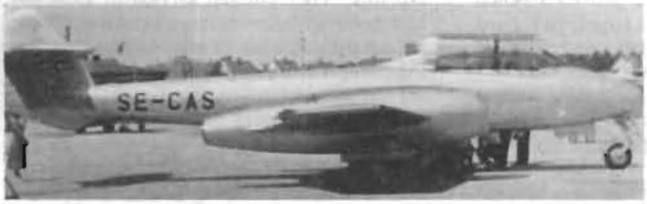
NEW LOOK SUPER SCAN, N57LM, is one of the first of the forty French S.C.A.N. licence-built Grumman G-44 Widgeon five/six-seat amphibians, imported by the U.S. for resale after re-engining, either with 270-h.p. Lycomings driving three-blade Hartzell airscrews (*Air Pictorial*, January 1956, page 21), or as above, illustrated for the first time, with 220-h.p. Continental W-670 radials. (*Photo: Burton Kemp, Chicago 30, Ill., U.S.A., via U.S. "Flying News".*)



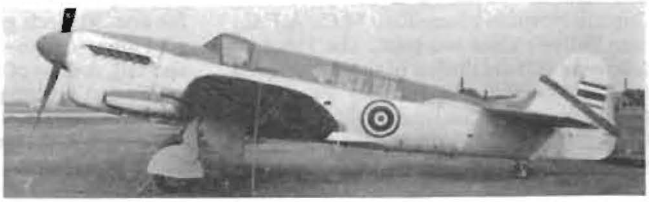
MYSTERE DE NUIT, the M.D.453-01 Mystère III (superseded by the Mystère IVN) is now modified for seat-ejection tests. Cameras are mounted in wingtip bulges. (*Photo: SPB/BR, France.*)



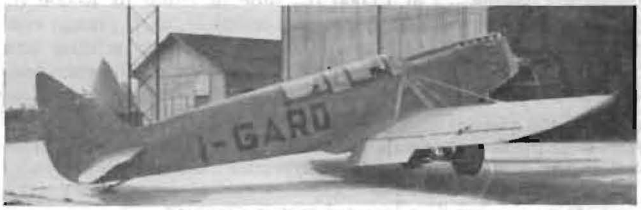
OPERATIONAL MYSTERE IIC reveals adoption of later Mystère IV-type, pylon-mounted, extra-long range fuel tanks and "sawn-off" non-tapered wingtips. (*Photo: SPB/BR, France.*)



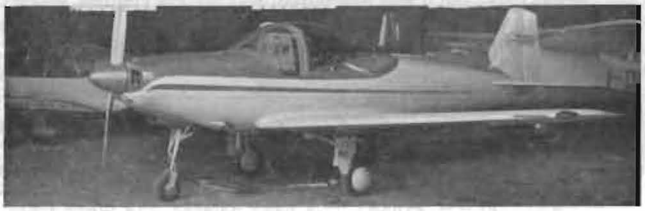
TARGET-TOWING METEOR 7 SE-CAS, operated in Sweden by Svensk Flygjänst A.B. (*Photo: F. K. Fogh-Nielsen, Copenhagen S.*)



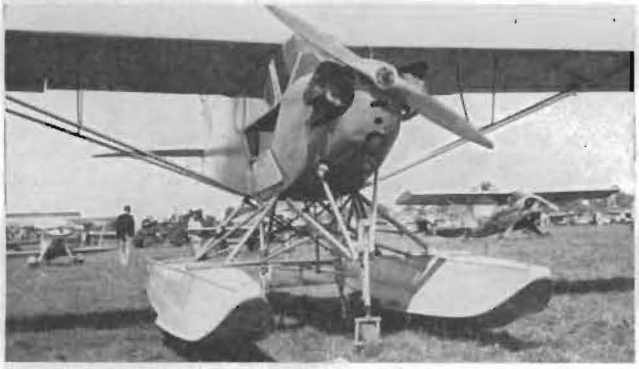
SIAMESE FIREFLY FR. Mk. I/ SF.12 (c/n. F.5645), of the Royal Thai Air Force. (*Photo: Chalmer A. Johnson, Alameda, California, U.S.A.*)



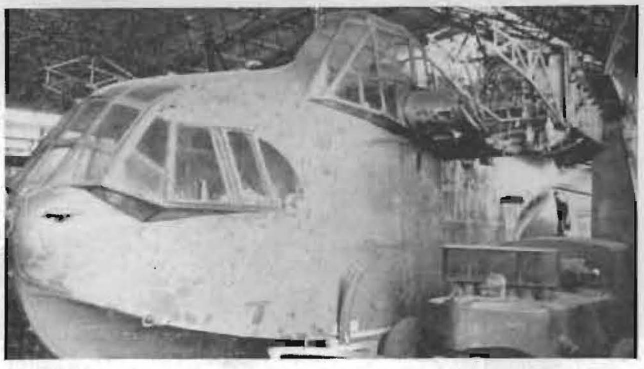
ONLY BREDA 39 still in flying condition, I-GARD is a tandem two-seat cabin tourer powered by a 130-h.p. Colombo S.63 in-line.



FIRST VIETRI F.8 SUPER FALCO, I-TRIP, flew for first time on 25th April. Ten of these two-seaters are under construction.

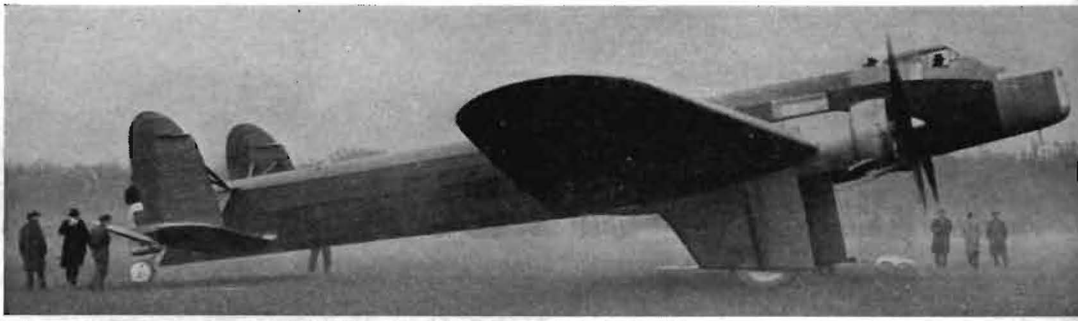


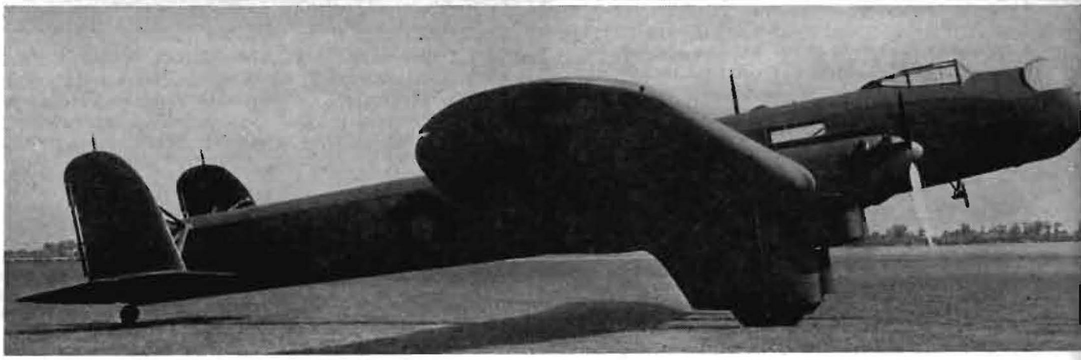
BIRDCAGE 'PHIBIAN, N98888(X) is a Piper J3C-75 Cub (75-h.p. Continental C-75) fitted with L. A. Gordonier's extraordinary, manually-operated nosewheel tricycle-cum-twin floats (Wollams) gear. (*Photo: Leo J. Kohn, Milwaukee, Wis., U.S.A.*)



BROKEN-UP GALLEON is one description for this flying-boat, discovered in a hangar at Toussus-le-Noble. Most of the recognition experts have been defeated, best attempt being to describe it as a scale model (Aérocentre N.C.420) of the Nord 1400 Noroit. Any offers?

1/144th Scale Plan of the Fairey Hendon





DESIGNED to Air Ministry Specification B.19/27, the one and only prototype Fairey Hendon I night bomber, serial number K1695, was built in 1930–31. It first flew in November 1931, piloted by Captain Norman Macmillan, M.C., A.F.C., then Fairey's chief test pilot. The Hendon, following as it did the last of the R.A.F.'s big biplane bombers, the Handley Page Heyford, was the first cantilever night bomber to be built in Great Britain and was of advanced concept.

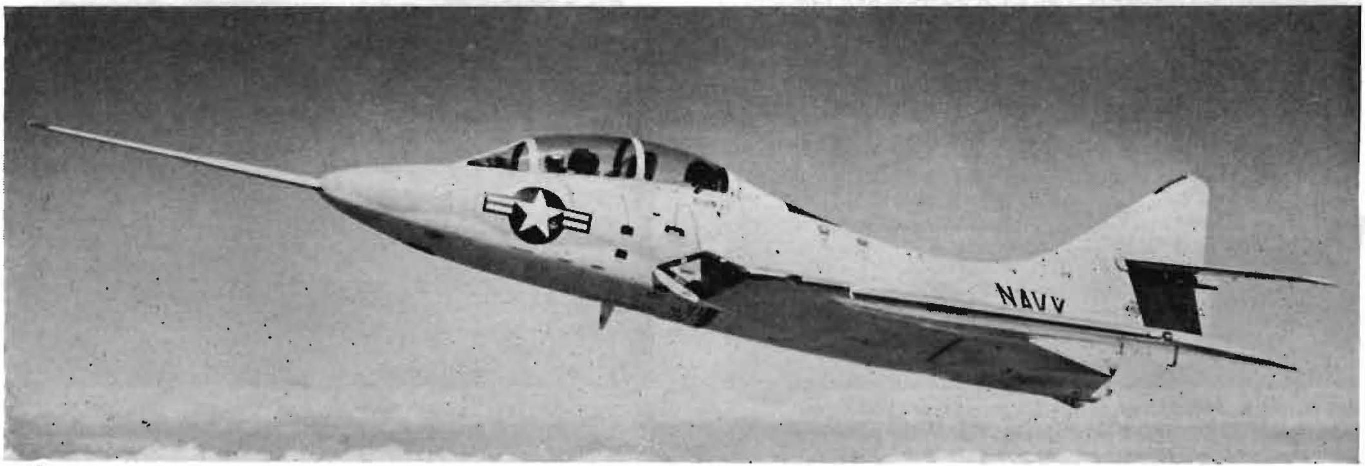
The cantilever wing was of thick section, and a maximum bomb load of 1,660 lb. was stowed in the centre section. The undercarriage was fixed, but it was well faired, and the radiators were in housings immediately ahead of the "trousers". Primary structure was of steel, either tube or high tensile drawn section, the use of duralumin being confined to secondary members, ribs and fairings. A catwalk extended from the nose to the gun position in the extreme tail. Three gun positions were provided—each for one .303-inch gun on a ring-type mount of Fairey design—in nose, centre-section and tail. A crew of five was carried.

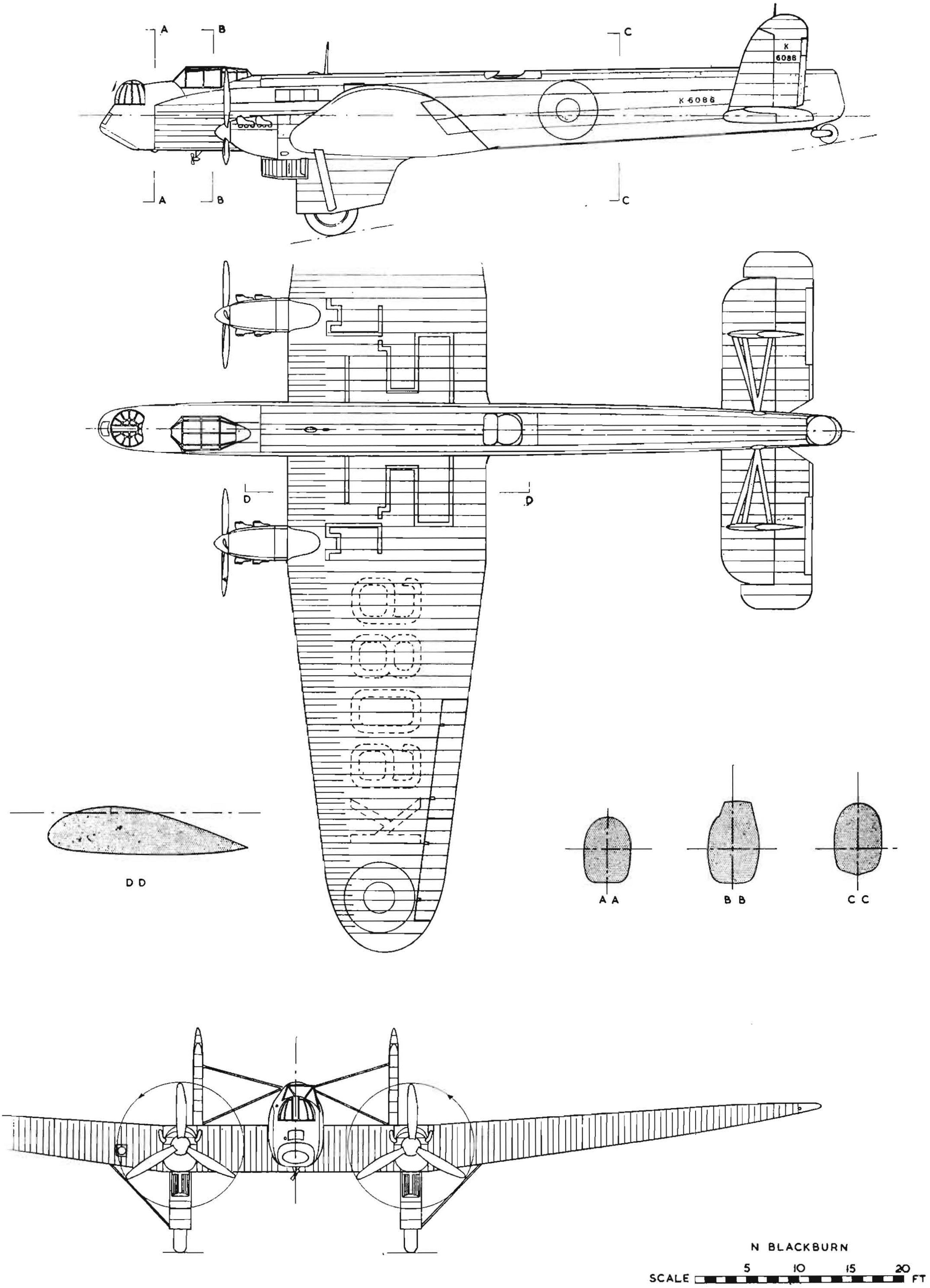
The first prototype was originally designed with Bristol Mercury V (Pegasus) engines, but the prototype first flew with 460-h.p. Jupiter VIIIs (XFs). K1695 eventually crashed in this form after experiencing difficulty in obtaining longitudinal stability attributed to the baffling of the engines, which caused premature stalling of the wing. Subsequently re-engined with 480-h.p. Rolls Royce Kestrel IIIs, K1695 first flew in this form, as the Mk. 1, in 1932.

Fourteen production Hendons (Mk. 2s) were built—at Stockport—to specification 20/34 for the R.A.F., and eventually equipped No. 38 Squadron at Marham, Norfolk. They entered service in 1936 but had been withdrawn from operational use before the outbreak of war. On the Mark 2 the cockpit and gun positions were enclosed. As an alternative to the bomb load, the Hendon could carry fifteen to twenty fully-armed troops.

Figures for the production aircraft, with Kestrel VIs, were: Span 101 ft. 9 in.; length 60 ft. 9 in.; weight empty 12,773 lb.; gross weight 20,000 lb.; maximum speed 156 m.p.h. at 15,000 ft.; time of climb to 10,000 ft. 15 min.; service ceiling 21,500 ft.; range with full load 1,360 miles. Colour scheme was olive drab overall with red and blue roundels.

Grumman F9F-8T Cougar. Announced in April, some time after the first flight, a 100-plus contract for the U.S. Navy's first transonic operational trainer, the F9F-8T Cougar. The "classroom" Cougar appears four years after the first production carrier-borne single-seaters started rolling off the Bethpage, Long Island, assembly lines. The Eight-Tee has involved the minimum of structural alteration. The fuselage length has been increased by 23 in. forward of the original cabin. To make way for the forward cockpit and equipment two of the original four 20-mm. cannon have been deleted, and when flown as a single-seater the F9F-8T's forward seat is occupied.

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"Second T.A.F."

A Visit to the R.A.F. in Germany

By William Courtenay, O.B.E., M.M.

NEW types of British aircraft with which 2nd Tactical Air Force (commanded by Air Marshal the Earl of Bandon) are now being equipped provide a heartening and indeed glowing picture of the manner in which British air strength is rising after being in the doldrums these past ten years. All the heroic effort being made by the nation through heavy taxation so cheerfully borne and in the factories of the aircraft industry are now bearing fruit. By courtesy of the Facilities Section of the Information Department of the Air Ministry, I was able to spend a week with 2nd T.A.F. during May to see these new aircraft and the new tactical doctrine which is gradually being fashioned for any war in Europe.

It is of course based on the premise that in the opening phase of a world war both sides would employ atomic weapons; that both would attempt to immobilise the other's air forces on the ground as the best means of protecting their own battle area, back yard, and home cities from utter destruction.

In fact the old "Stuka-cum-Panzer" technique, which served the Germans so well in Europe until they were stymied at the English Channel where amphibious assault had first to succeed before dive-bomber and tank could work in collaboration again, is being brought up to date. That is what it really amounts to.

Two factors from the past arise to guide strategic thinking aright for the future. In one hundred days of war (thirty in Poland in September 1939, and the rest between invasion of Norway and Denmark, 9th April, and the capitulation of France close of June 1940), Hitler secured mastery of Western Europe; stood upon a coastline of 2,000 miles from the Arctic Circle of Norway to Brest; semi-encircled the British Isles; left us little room for manoeuvre for the first three years of the war, save for what Bomber Command could accomplish over Germany; and brought his forces to the English Channel, thus threatening the British Isles with a serious prospect of invasion for the first time since 1066.

Opposition immobilised

All this was done by immobilising opposition air forces on the ground first; so they never even got into the air—the only place where aircraft fight. With this air superiority established at trifling cost the rest was easy—until the "sea which serves us in the office of a moat" was reached.

The second factor is that—as the U.S. Strategic Survey records—72 per cent of all bombs dropped by the R.A.F. and U.S. Air Force combined on Europe were delivered to targets *after* 1st July 1944. That is after the liberation of France was well under way; a continental foothold established; the German Army's communications disrupted and the Luftwaffe's forward Early Warning system overran. In fact the Survey makes it plain that this destruction of the warning system enabled our bombers to reach their targets to inflict decisive results.

Marshal of the R.A.F. Sir John Slessor draws attention to this in his recent book *The Central Blue*.

Complete air cover

There is a third lesson for all who study the role of tactical air power in modern war. In the three years of the Korean Campaign (25th June 1950 to 27th July, 1953) the gradual build-up of the U.S. 5th and Far East Air Forces, of 77 Squadron Royal Australian Air Force, and of carrier pilots operating from the seas below Port Arthur, permitted twenty-four-hour round-the-clock Interdiction. As a result the Chinese and North Korean Communist armies could not use their roads and rails effectively to bring sufficient heavy armament to the front to secure decision; they were never allowed to use any airfields in North Korea; air superiority was so complete that never through that campaign had the United Nations to worry about air raids; the troops never had to dig in against that risk; never lost a sleepless night; never had to bother camouflaging vehicles or guns. And in winning and holding complete command of the air the U.S. Air Force lost 58 "Sabres" while the Communists lost 805 MiG 15s.

In the tactical battle area the lesson is crystal clear. If air superiority can be assured by destruction on the ground of an enemy's ability to wage war in the air, both one's own terrain is rendered inviolate while his becomes an open exposed area at the mercy of the side which holds this air mastery.

How is this to be translated into action in Europe in the light of modern atomic power? It is to be done initially by destruction of an enemy's "eyes and ears". This is by paralytic strokes against his radar chain; his early warning system; and his airfields. In fact the dangers involved in atomic attack are so great that today immense emphasis is to be placed on the role of Fighter/Reconnaissance. It is here that the Vickers Supermarine Swift (Mark 5) enters the picture, and at the R.A.F. Station Geilenkirchen I saw three arrive from the R.A.F. Ferry Base.

In the new concept of the vital role which the Swift will play, it will be essential to spot a target quickly; photograph it with accuracy; and return to base so that mobile Field Photographic Sections and Photographic Intelligence Detachments may take prints and rush them to a Field Commander within minutes of a target first being spotted; it can then be attacked before it has had time to move.

Swift pilots must be more than good pilots; they must develop a higher form of true airmanship than the interceptor pilot. They must be good map readers and good cross-country flyers and develop that same eye for country which a reconnaissance surface scout acquires. Flying at tree-top level, keeping below radar screens, relying on silent approach because of supersonic speed, both for surprise and for immunity from ground attack, the Swift with its three cameras must be able to find with speed and precision a target from a map reference or other clue; see it visually, photograph it, and make good the getaway with the vital information.

On this the strike aircraft of the Tactical Air Forces will go into battle to pull targets out and take the sting out of atomic menace. The role is still essentially one of working with field armies, and for this reason No. 2 Squadron and others which will form up with the Swift have Army Liaison Officers constantly with them, training them in finding targets in difficult terrain; targets which Army Intelligence may first be aware of, and which the Fighter/Reconnaissance pilot must confirm before strike aircraft are sent into heavily defended areas.

2nd T.A.F. becomes 2nd Allied T.A.F. where allied air forces join the R.A.F., and the Belgian units in 2nd T.A.F. come under this heading. They are using the swept-wing version of the U.S. F.84 in exactly the same role. The Swift may well prove to be an aircraft which will dominate a tactical battle area by its deadly work and immunity from attack. Interdiction of a tactical battle area must be as continuous as an artillery barrage to be decisive; any let-up for some hours through weather or because of darkness gives an enemy the essential breathing time to recover and build up.

Canberra's role

It is here that the new English Electric Canberra B.8 Night Interdictor will play its part with 2nd T.A.F. The first one arrived while I was at R.A.F. Widenrath, flown from U.K. by the Station Commander, Group Captain R. J. B. Burns, O.B.E.

The Hawker Hunter will be used both as an interceptor and day fighter; the Canberra as the night interdictor; and between these new types and older types of day fighter and light bomber we see the pattern for "isolating a battlefield".

2nd T.A.F.'s task is therefore to develop this pattern of close reconnaissance which will be as near 100 per cent reliable and dependable as possible. By the role of the Swift the Air Forces will receive warning of enemy build-up; and by securing air superiority, as much by destruction of the "eyes and ears" on the ground as by "dog fights" in the air, the path for the heavy bombers to enemy targets will be kept open while our own back areas will be protected.

It is the Hunter, of course, which will secure command of the air where this is challenged *in the air*; but the main aim will be to prevent an enemy from being able to rise to offer combat. I visited the Hunter Squadrons at Jever and it was good to see so many of them there. Four Squadrons are in process of acquiring them or are operational. They are Nos. 3 (F) Squadron, now re-equipping with the Hunter IV from the Canadian-built Sabre, No. 234 (Madras Presidency Squadron), and No. 93 (F) Squadron, who have had their Hunters for nearly a year.

Devastating fire-power

As a firing platform—the supreme test of the value of an interceptor—the Hunter is proving reliable and satisfactory where two guns are fired. But it must be remembered that the Hawker Hunter uses 30-mm. shells, not 20 mm. as with many other fighters. An aircraft disintegrates if struck by three or four of these shells. Therefore good accurate firing by two guns is sufficient to secure decisive results. A theory is in fact being developed of deliberately keeping two guns inactive so they can be brought into play in reserve: for a second attack at the same target should it present itself twice; or for another aircraft attack during the same sortie. It may well be that this will be adopted as standard procedure.

It is of course at R.A.F. Sylt that one sees the firing practice and I flew there to watch No. 4 Squadron (from Jever) at the ranges. Here the drill has been worked out with the precision of the Guards at a Colour Trooping ceremonial. Every minute of the daylight is utilised at the ranges over the North Sea.

At this time of year with long hours of daylight, first aircraft are on target at 07.20 hours. Pilots fire in pairs at immense flags towed behind Meteors acting as aerial tugs.

A pilot and his No. 2 or wingman take part in an interception in three phases of training. The Meteor tows 800 ft. of nylon rope, at the end of which is the flag, 25 ft. by 6 ft. These white flags are edged with black for easier vision and have a centre black spot as aiming point. They are not easy to pick up in haze or at altitude. Firing commences at 10,000 ft., the rounds being dipped in various shades of paint so that different shots from different altitudes can be identified. Six colours are used.

The pilots feel there is no difficulty with the electrically fired Aden gun at high altitude.

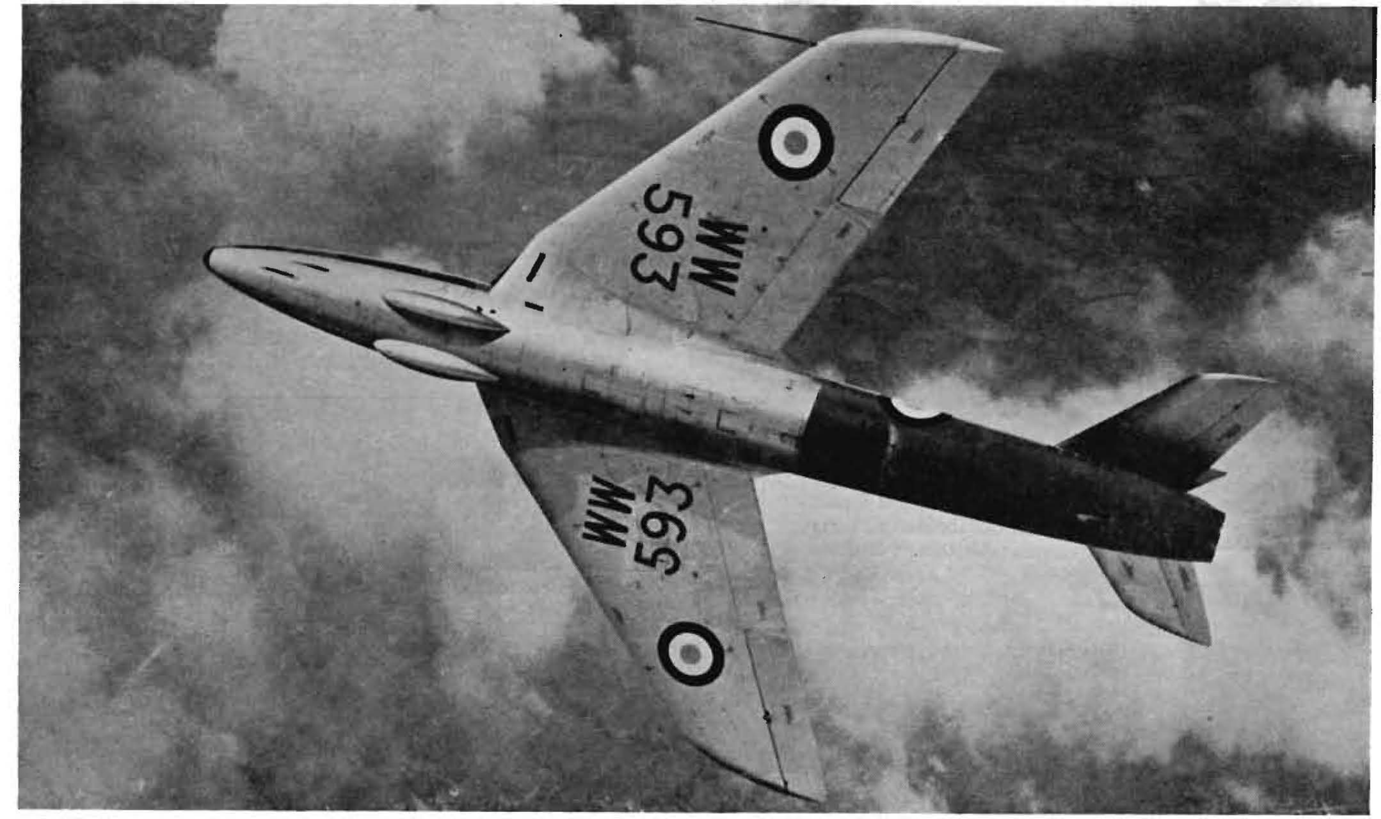
The pack of four guns ready ammunitioned is changed; the Hunter refuelled; oxygen topped up; and the aircraft turned round ready for flight all in a very few minutes. I watched expert R.A.F. crews doing this with intense enthusiasm.

Thus the Hunter is going to prove capable of taking care of any hostile bomber it is expected to contend with for perhaps the next five or seven years.

Closing the gaps

Between it and the American F-100 we should be able to dominate the skies in Western Europe; over all the NATO area and over Britain and adjacent waters this year. These fighters are closing the gaps in defence. When the Canberra B.8 is here in sufficient numbers with well-trained crews for Night Interdiction, and when the Swift Squadrons become operational, we should be in a formidable defensive position in 2nd T.A.F. And since already, as both Field-Marshal Montgomery and General Guenther have repeatedly stated, the Russians must now concentrate before they could attack—that is, march new divisions into the West preparatory to attack—this would give us the tip-off that they meant business. On the ground we cannot now be taken by surprise.

Hunter F. Mk. 6 is illustrated in one of the first views of this latest mark of Avon-powered Hunters. Marks 2 and 5, built by Armstrong Whitworth Aircraft at Coventry have the Armstrong Siddeley Sapphire turbojet. Today, the Hunter is the most important British aircraft contribution to N.A.T.O. Apart from the one hundred and fifty being delivered to Sweden, there are N.A.T.O. and R.A.F. contracts still being completed which total more than one thousand Hunters. The Mk. 6 is reported to have a late series Rolls-Royce Avon, possibly the R.A.28 which may be boosted to 14,000-lb. s.t. with afterburning. The F. Mk. 6 Hunter has a slightly enlarged tailpipe.



British Civil Register News

NEW REGISTRATIONS

G-ANBI	Bristol Britannia 102 (12910)—British Overseas Airways Corp.
G-ANBJ	Bristol Britannia 102 (12911)—British Overseas Airways Corp.
G-ANBK	Bristol Britannia 102 (12912)—British Overseas Airways Corp.
G-ANBL	Bristol Britannia 102 (12913)—British Overseas Airways Corp.
G-ANBM	Bristol Britannia 102 (12914)—British Overseas Airways Corp.
G-ANBN	Bristol Britannia 102 (12915)—British Overseas Airways Corp.
G-ANBO	Bristol Britannia 102 (12916)—British Overseas Airways Corp.
G-AOCP	Auster 5 (1800)—R. G. Simpson
G-AOJT	D.H.106 Comet 1, XB (06020) (Previously F-BGNX)—de Havilland Aircraft Co.
G-AOJU	D.H.106 Comet 1, XB (06021) (Previously F-BGNY)—de Havilland Aircraft Co.
G-AORA	D.H.82A Tiger Moth (BB.750)—Luton Flying Club Ltd.
G-AORC	Vickers Viscount 802 (253)—British European Airways Corp.
G-AORD	Vickers Viscount 802 (254)—British European Airways Corp.
G-AORG	D.H.114 Heron 2 (14101)—British European Airways Corp.
G-AORH	D.H.114 Heron 2 (14102)—British European Airways Corp.
G-AORO	Piper PA-22 Tri-Pacer (22-2098) (Previously VP-KMY)—T. W. J. Harrison
G-AORT	Westland S.55 WA.173—Westland Aircraft Ltd.
G-AORX	D.H.82A Tiger Moth T.7340—Rollason Aircraft and Engines Ltd.

CANCELLATIONS

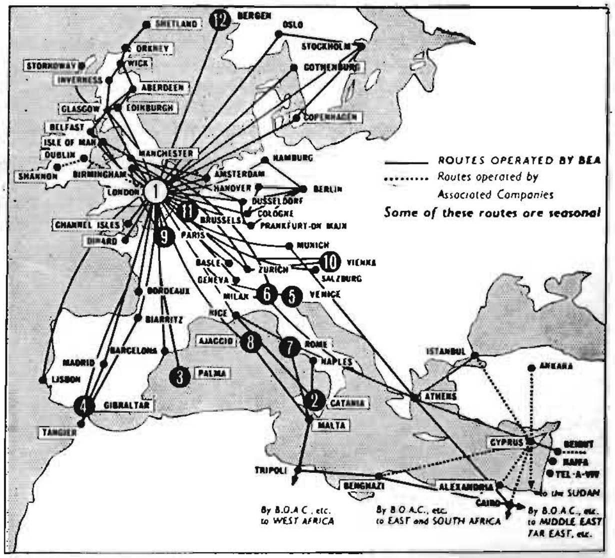
(Abbreviations: D—destroyed, SA—sold abroad, WU—withdrawn from use)

G-ACHP	Avro 638 Club Cadet (653) *(D)*—D. F. Ogilvy and Partners
G-AHBI	Percival Proctor 5 (Ae38) *(SA)*—Wiltshire School of Flying Ltd.
G-AHIL	Short S45 Solent 3 (S.1300) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIM	Short S.45 Solent 2 (S.1301) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIN	Short S.45 Solent 3 (S.1302) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIR	Short S.45 Solent 2 (S.1304) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIS	Short S.45 Solent 3 (S.1305) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIT	Short S.45 Solent 2 (S.1306) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIU	Short S.45 Solent 2 (S.1307) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIW	Short S.45 Solent 2 (S.1309) *(WU)*—Ministry of Transport and Civil Aviation
G-AHIY	Short S.45 Solent 3 (S.1311) *(WU)*—Ministry of Transport and Civil Aviation
G-AKNS	Short S.45 Solent 3 (NJ.205) *(WU)*—Ministry of Transport and Civil Aviation
G-ALRY	Percival P.54 Prince 1 (P.50/8) *(SA)*—Hunting Aerosurveys Ltd.
G-ALZJ	D.H.89A Rapide (X.7413) *(SA—French Morocco)*—Independent Air Travel Ltd.
G-ANDJ	D.H.82A Tiger Moth (N.9367)—West London Aero Services Ltd.
G-ANJK	D.H.82A Tiger Moth (T.6066) *(WU)*—Not known. Temporarily unregistered
G-ANKA	D.H.82A Tiger Moth (N.5474) *(WU)*—Not known. Temporarily unregistered
G-ANKB	D.H.82A Tiger Moth (N.6911) *(WU)*—Not known. Temporarily unregistered
G-ANKH	D.H.82A Tiger Moth (N.9206) *(WU)*—Not known. Temporarily unregistered.
G-ANKL	D.H.82A Tiger Moth (DE.474) *(WU)*—Not known. Temporarily unregistered.
G-ANPX	D.H.82A Tiger Moth (DE.356) *(WU)*—Not known. Temporarily unregistered
G-ANTT	D.H.82A Tiger Moth (N.9392) *(D)*—Mrs. O. J. Marmol
G-ANZR	D.H.82A Tiger Moth (R.5115) *(SA—Germany)*—Wiltshire School of Flying Ltd.
G-AOAM	Beech A.35 Bonanza (D.1990) *(SA—Belgium)*—L. R. Snook
G-AOGP	D.H.82A Tiger Moth (DE.632) *(SA—Malaya)*—Not known. Temporarily unregistered
G-AOGR	D.H.82A Tiger Moth (T.6099) *(SA)*—Not known. Temporarily unregistered
G-AOGT	D.H.82A Tiger Moth (83594) *(SA—Spain)*—Aerocontacts Ltd.
G-AOHX	Westland-Sikorsky S.51 (Mk. 1A) (WA/H/139)—Westland Aircraft Ltd. *(SA as JA.7025)*

ALTERATIONS

G-ABJJ	D.H.60G Moth (1840)—R. K. Dundas Ltd.
G-AEWV	Aeronca 100 (AB.117)—S. A. Brown
G-AEYE	Percival Q6 (Q.20)—J. B. Peak & Partner
G-AFRK	D.H.89A Rapide (6441)—Airviews Ltd.
G-AGSH	D.H.89A Rapide (6884)—Airviews Ltd.
G-AGTT	Auster 5 J.1. Autocrat (1826)—J. J. Parker
G-AHBL	D.H.87B Hornet Moth (8135)—Rollason Aircraft and Engines Ltd.
G-AHHP	Auster 5 J.1. Autocrat (2019)—J. Braithwaite
G-AHPR	Vickers Viking 1B (164)—Independent Air Travel Ltd.
G-AHRC	D.H.82A Tiger Moth (T.6064)—William Tomkins Ltd.
G-AHWZ	Percival Proctor 5 (Ae82)—Not known. Temporarily unregistered
G-AIEH	Percival Proctor 2 (BV.556)—M. J. Dible
G-AIEP	Percival Proctor 5 (Ae98)—H. W. Gray

THE BEA HISTORICAL MAP OF EUROPE



1. *Sir Walter Raleigh (1552-1618) pioneer of the English colonies.*
2. *Garibaldi leading his " Thousand " in Sicily, 1859.*
3. *Chopin and George Sand who went to Majorca in 1838.*
4. *The English fleet under Admiral Rooke capturing Gibraltar, 1704.*
5. *Marco Polo (1254-1324), Venetian explorer, on his way back from China.*
6. *Frederick Barbarossa, German Emperor, entering Milan, 1162.*
7. *The Roman Emperor Caligula (A.D. 37-41), who declared his horse Incitatus a priest and a consul.*
8. *Napoleon, born in Corsica in 1769, on board H.M.S. Bellerophon after his defeat at Waterloo.*
9. *The French Revolution, 1789. Storming of the Bastille.*
10. *Johann Strauss (1825-1899), Viennese composer of the " Blue Danube " and many other waltzes.*
11. *The Duke of Wellington at the Battle of Waterloo (1815).*
12. *Amundsen, Norwegian explorer, on his way to the South Pole (1911).*

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BRITISH EUROPEAN AIRWAYS

G-AIGP	Auster 5 J.I. Autocrat (2165)—Not known. Temporarily unregistered
G-AIGR	Auster 5 J.I. Autocrat (2172)—Leicestershire Aero Club Ltd.
G-AIYS	D.H.85 Leopard Moth (7089)—Surrey Aviation Ltd.
G-AJBU	Vickers Viking IB (246)—Fieldair Ltd.
G-AJEE	Auster 5 J.I. Autocrat (2309)—West London Aero Services Ltd.
G-AJKL	Miles M.38 Messenger 2A (6358)—A. N. Wright
G-AJNE	Airspeed A.S.65 Consul (5139)—J. Crewdson
G-AJRN	Auster 5 J.I. Autocrat (2612)—Not known. Temporarily unregistered
G-AJSP	Fairchild 24W-41A Argus (872)—Miss D. Daams
G-AKPE	Miles M.14A Hawk Tr.3 (N.3775)—H. E. Riley
G-AKZG	Percival Proctor 3 (LZ.760)—G. P. Layton
G-ALDU	H.P.81 Hermes 4 (H.P.81/21)—Not known. Temporarily unregistered
G-ALDX	H.P.81 Hermes 4A (H.P.81/24)—Not known. Temporarily unregistered
G-ALIT	Percival Proctor 3 (DX.240)—Not known. Temporarily unregistered
G-ALTZ	Airspeed A.S.65 Consul (5134)—Leon M. Berner & Co. Ltd.
G-AMRL	Auster J.5F Aiglet Tr. (2779)—Sutherland Transport & Trading Co. Ltd.
G-AMTM	Auster 5 J.I. Autocrat (3101)—Brooklands Aviation Ltd.
G-ANBG	Bristol Britannia 102 (12908)—British Overseas Airways Corp.
G-ANCX	D.H.82A Tiger Moth (T.7229)—Not known. Temporarily unregistered
G-ANKT	D.H.82A Tiger Moth (T.6818)—R. E. Webb
G-ANRP	Auster 5 (1789)—N. B. Stephenson & Partners
G-ANVJ	Percival Proctor 4 (NP.338)—R. K. Dundas Ltd.
G-ANYK	D.H.90A Dragonfly (7529)—Not known. Temporarily unregistered
G-ANYR	Percival Proctor 4 (NP.185)—S. W. Broadmeadows & Partners
G-ANZS	D.H.82A Tiger Moth (T.6813)—W. P. Wickson
G-AOBW	Percival Proctor 4 (NP.339)—Cartwright Hamilton Aviation Ltd.
G-AODP	Westland S.55 Series I (WA.117)—Fison-Airwork Ltd.
G-AOHF	Auster J5P Autocar (3191)—Auster Aircraft Ltd.
G-AOIS	D.H.82A Tiger Moth (R.5172)—Not known. Temporarily unregistered

AIRPORT NOTES—INTERESTING VISITORS

Blackbushe

1/5	131408	Pv. 5s—U.S. Navy
	D-CFSA	Marathon—(A) Hamburg
2/5	908	Invader—French Air Force; (A) Le Bourget
	N2966	Mallard—M. Boussac; en route Newmarket
11/5	N2423	Viscount—Capital Airlines
20/5	No. 04	S.I.P.A. Minijet—en route to Speke
22/5	No. 04	S.I.P.A. Minijet—en route to Paris via Le Touquet
25/5	D-AEDO	Viking—Karl Herfurtner

Croydon

6/5	N2476D	Cessna 170
7/5	HB-ECG	Beech A.35 Bonanza
	G-AORG	Heron 2—Jersey Airlines Ltd.; delivery flight
9/5	OY-FAG	K.Z.2—ex-D.A.F.109, c/n. 117; Harald Thyregod, Ølgod
10/5	F-BBCS	Stinson Reliant—c/n. 3/5846; Benoit Millien, Toussus
11/5	OO-MPH	Bonanza
14/5	D-EJEC	Tri-Pacer
17/5	F-OAUA	Twin Bonanza
	VP-KNV	Scan 30/1—ex-F-BGTD, c/n. 19; Lake Air Charters, Mwanza, Tanganyika
17/5	HB-XAM	Leopard Moth—c/n. 7127; Georges Borgeaud, Cointrin
20/5	F-BBES	Norécrin—c/n. 333; Laboratoires Goupil-Savener, Toussus
21/5	SE-BUS	Tri-Pacer—A. B. Damkappe, Box 1, Göteborg, Göteborg
31/5	F-BGXM	Navion—c/n. 1144; Edmonde Masurel, Lille
1/6	G-AJOR	S.51—c/n. 5132; Autair Ltd.; returned after Antarctic trip with S.S. *Olaf Sven*; also G-AJHW in crates

London

6/5	VP-YNA	Viscount 748—C.A.A., c/n. 98; "Malvern" delivery flight
10/5	G-ALBO	Britannia 101—M.o.S.; new red and white colour scheme
11/5	128426	R6D-1Z—U.S. Navy; large serial on fin
18/5	LR-ACM	Bristol 170/31—Middle East Airlines (ex-EI-AFR and G-AMLJ, c/n. 13072)
21/5	N54333	Dakota—Republic Aviation; undercarriage doors on main wheels
	G-AHNL	Tudor 4B—Air Charter Ltd.
25/5	G-ANBH	Britannia 102—B.O.A.C.
	G-AHNM	Tudor 4B—Air Charter Ltd.
27/5	G-ANBG	Britannia 102—B.O.A.C.
28/5	YI-ACM	Viscount 735—Iraqi Airways, c/n. 69
	O-5606	C.54G—U.S.A.F. Radar nose

Northolt

23/5	XJ320	Sea Devon C20—F.A.A. (ex-G-ANDY, c/n. 04441)
24/5	9699 (GC699)	Bristol 170—R.C.A.F.
	WD482	Hastings—large H25 scanner under fuselage
28/5	49-070	SA-16a—U.S.A.F.
29/5	17150 (JM/150)	R4D-8—U.S. Navy
	52-6172	L-23—U.S. Army
	XJ321	Sea Devon C20—F.A.A.
3/6	VX574	Valetta C2—brought Sir John Harding from Cyprus
4/5	52-6173	L-23—U.S. Army
7/5	52-6137	L-20a—U.S.A.F.
14/5	9697 (GC697)	Bristol 170—R.C.A.F. (ex-G-AINO, c/n. 12830)
	No. 187	Flamant—French Airforce

Prestwick

6/5	YE-AAL	Aero Commander 560A—(E) Yemen Airlines; delivery
11/5	38157	Lockheed YC-121F Super Constellation—(E) USAF/MATS; fitted with Turbo-props; 1700th Air Transport Group
15/5	N9911F	D.H. Mosquito—(W) pilot, Capt. Leech; delivery to U.S.A.
17/5	F-OAVA	Beechcraft Twin Bonanza—(E) Aerotec; delivery
20/5	4604	Fairchild C123B Provider—(E) one of a flight of eleven U.S.A.F. ferrying to Europe
24/5	N733PA	Douglas DC-7C (Clipper Blue Jacket)—(E) P.A.A.; first to land in Britain
2/6	N20X	Beechcraft Super 18—(W) private owner
4/6	CF-CRJ	Lockheed Hudson—(W) Kenting Aviation Ltd.; on hire to Photo Survey Corp.

Viscount Deliveries (Dates in parentheses)

Capital Airlines: N7422 (7/5); N7423 (14/5); N7424 (19/5); N7425 (30/5); N7426 (1/6)
Trans Canada Airlines CF-TGZ (12/5)
Compania Cubana de Aviacion S.A. CU-T603 (18/5); CU-T604 (5/6)

United States Armed Forces Day—Saturday, 19th May 1956

R.A.F.		*U.S.A.F.*			
WV399	Hunter F.4	12533	C119C	51-8820	T-33A
WV601	Provost T.1	51-5096	SA-16A	43-16250	C47D
TW575	Auster A.O.P.6	52-2681	KC-97G	52-10030	F86D
WD476	Hastings C.2	139203	B26C	52-963	C124C
WX865	Venom N.F.3	48-036	RB-45C	45-630	C54G
XD522	Vampire T.11	44-87629	B-29A	53-8155	C119G
WZ857	Chipmunk T.10	26763	F-84F	272521	SC-54D

FORTHCOMING EVENTS

21st July	R.Ae.C.: National Air Races, Third Round (including King's Cup Race), Baginton, Coventry.
,, ,,	R.N.A.S. Lossiemouth: At Home.
,, ,,	R.N.A.S. Anthorn: At Home.
22nd July	Northamptonshire Aero Club: At Home.
28th July	Lasham Gliding Centre: At Home.
,, ,,	R.N.A.S. Yeovilton: At Home.
,, ,,	R.N.A.S. Culdrose: At Home.

The next Meeting of The London Society of Air-Britain will take place on Wednesday, 4th July 1956 at 7.00 p.m. in the Kent Room, Caxton Hall, London, S.W.1. Two films will be shown: M.G.M.'s "Men of the Fighting Lady" and Republic's "Flying Tigers".

Well Paid to See the World

If you are 16 or over, fit, and want to see the world while doing a really interesting and worthwhile job there is a fine chance for you as a Radio Officer in the Merchant Navy. If your Service experience includes signals or wireless it will shorten your training period. It will take 12–18 months to train you, then you go to sea with officer status. Pay for seagoing officers begins at £28 10s. 0d. a month, 'all found', rising to £77. Sea service provides opportunities to advance your technical knowledge of electronics and widens your experience of the world and responsibility so that many highly paid posts ashore are open to you later on. Write for full particulars to Mr. F. E. Ash, Superintendent of Training, Dept. D1, The Marconi International Marine Communication Co. Ltd., Marconi House, London, W.C.2.

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Their thoughts in the sky, their feet on the ground, aircrew blend courage with careful skill.

Per ardua . . . ad astra. *It is not easy to fly with the R.A.F., to lead others, to shoulder great responsibilities while still young. But in the lasting satisfaction of this immensely worthwhile career . . .*

great effort finds great reward

The Royal Air Force

Flying . . . and a career

A YOUNG MAN'S DREAM may dwell on flying — on the exhilarating challenge in the airy spaces of sky. His commonsense tends to call him back to earth — to consider the future and the building of a career.

Feet on the ground

In the Royal Air Force today you can satisfy both these demands — and the new appointment of Air Electronics Officers means more can now fly. These highly skilled men are trained to be responsible for all the electronic devices in the new V-bombers. But aircrew are much more than flyers. They are often seconded for other important work in Britain and abroad. Training others, international liaison, aircraft development — these are but some of the jobs that may come your way. And responsibility grows fast. You can be a Group Captain while in your early forties, responsible for perhaps fifteen hundred men and several squadrons of modern aircraft. Beyond that? There is no limit. Quality counts in the R.A.F. and there will always be room at the top for good men.

A sure future — good pay

You can join the R.A.F. through the Direct Commission Scheme, confident of a permanent career right up to pension age. Or you can choose a twelve year engagement, with the option of leaving after eight. If you leave after 12 years you take back to civilian life a tax-free gratuity of £4,000! Whichever you choose the pay is good. At the new rates, a Flight Lieutenant of 25 for instance, can draw, with full allowances, about £1,500 a year.

Present action — Future perfect

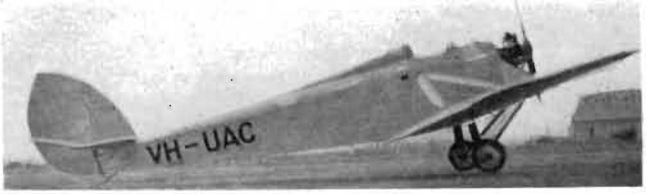
Travel, adventure, opportunity, achievement . . . here is a unique chance to blend them all in the satisfaction of a great career. Are you qualified to grasp it?

Responsibility. To fly with the R.A.F. is to work with the most dependable men in the world, confident and well qualified for each of the many calls on their skill and initiative.

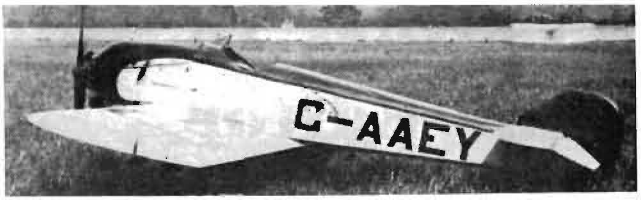
And relaxation. Work over, pleasure begins. Gliding, yachting, winter sports — these and many other privileged pastimes link up with a social life that is full and varied.

HOW TO FLY WITH THE R.A.F.

You must be between 17½ and 26 and absolutely fit. You must have General Certificate of Education or Scottish Leaving Certificate or their equivalents. You must be able to lead others, and you must have aptitude as well as enthusiasm for flying. If you feel you have all these qualities, write at once for details of the Schemes of entry to the Air Ministry (GR.305), Adastral House, London, W.C.1. Give date of birth and educational qualifications.

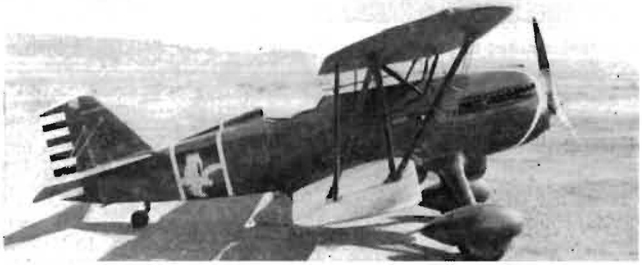


MODIFIED D.H.53—Humming Bird single-seat ultra-light, built at Stag Lane in 1924 (c/n. 103; ex-G-**AUAC**, old Australian registration form). Standard production motor (32-h.p. Bristol Cherub III 2-cylinder engine) has been replaced by heavier 35–40-h.p. ABC Scorpion 3-cylinder motor resulting in cut-back nose, with airscrew *just* clearing airframe. Prototype (1923, c/n. 101, G-EBHX) had 700-c.c. Blackburne engine giving maximum speed of 76 m.p.h. for a.u.w. 490 lb. Span 30 ft. 1 in.; length 19 ft. 8 in. (*Photo via: Hal G. Martin, Miami, Fla., U.S.A.*)

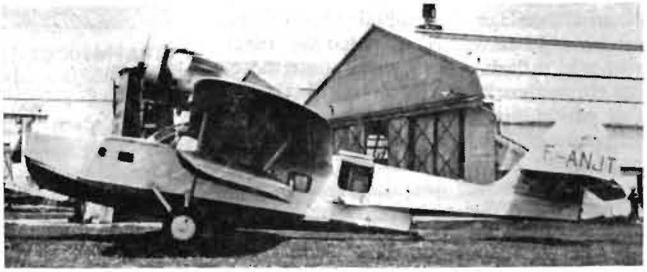


GADFLY AT BROOKLANDS, with the old racing track in the background, G-AAEY was the first prototype of the Henderson & Glenny H.S.F. II—a single-seat ultra-light powered by a 40-h.p. ABC Scorpion. A second Gadfly, G-AARK had a 40-h.p. Salmson motor. Other 1929 British ultra-light contemporaries included: the A.B.C. (Motors) Robin (G-AAID); Nick Comper's C.L.A.7 Swift (G-AARX; 40-h.p. Scorpion) and the Hendy 281 Hobo (G-AAIG; Scorpion). **Gadfly (Scorpion)**; 91 m.p.h. at a.u.w. 750 lb. Span 25 ft. 10 in.; length 17 ft. 10 in.

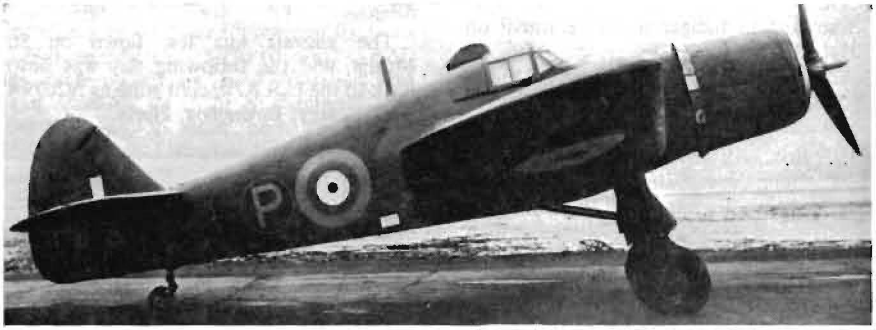
PHOTOS BY REQUEST



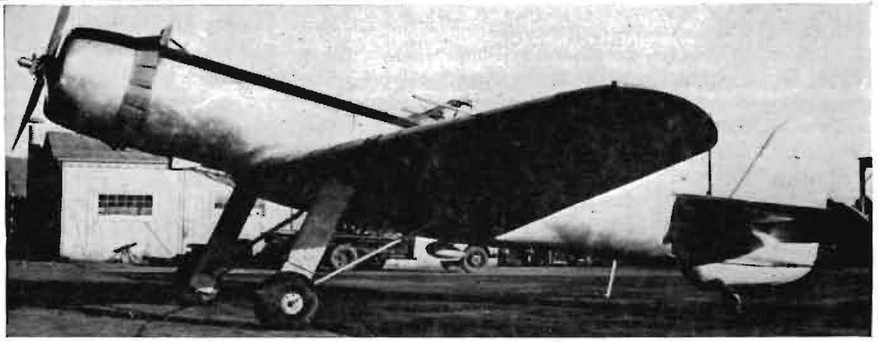
MOST BEAUTIFUL HAWK of the 1920s and '30s was the Curtiss P-6E of 1932—eventually forty-six were brought up to 'E standard, which in turn was the ultimate form after combining the experimental YP-20, XP-22 and YIP-22 Hawks. Maximum speed for a.u.w. of 3,436 lb. was 197 m.p.h. on 600-h.p. Curtiss V-1570-23 driving 3-blade, f.-p. metal airscrew. Span 31 ft. 6 in.; length 23 ft. 2 in. Aircraft of the period carried squadron insignia in lieu of fuselage cockades. (*Photo: Hal G. Martin archives.*)



JADE BLANC V was the name given by the pre-war French charter company Air-Bleu to their twin-engined amphibian F-ANJT, an American-built Douglas D.117 Dolphin II (c/n. 1278). The pylon-mounted motors were 350-h.p. Pratt & Whitney R-985 Wasp Juniors. The Dolphin was first built in 1931 and had U.S.A.A.C. designations: OA-3 and -4, Y1C-21, Y1C-26 to C-26B and C-29 (also U.S.N. RD series). Span 60 ft. 6 in.; length 43 ft. 10 in. Maximum speed 140 m.p.h. for a.u.w. of 8,590 lb.

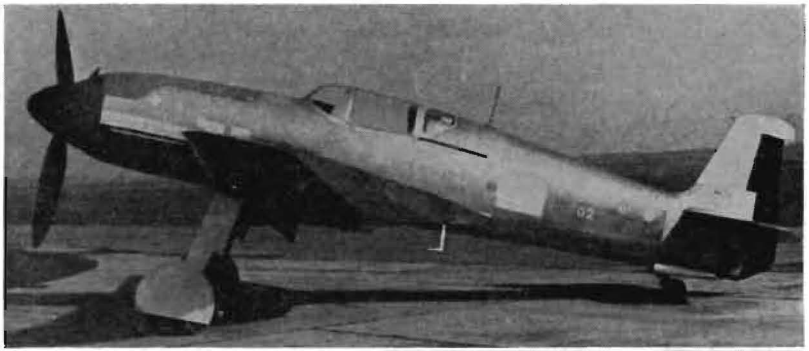


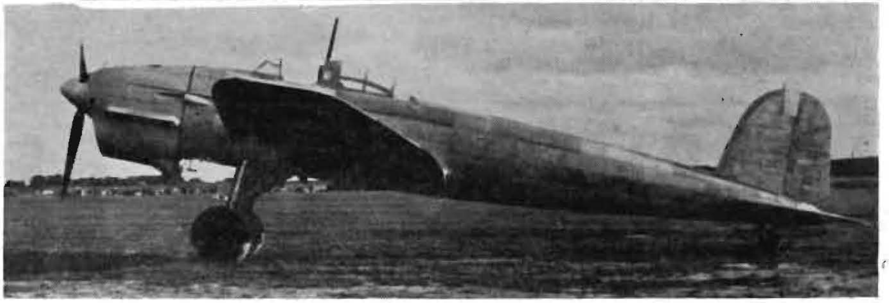
A FOLLAND F.T.B. (HERCULES) A hitherto unpublished photograph of P1775 the second of twelve specially-designed flying test beds (P1774-'85) built by Folland in 1940 to Air Ministry Spec. 43/37. Retrospective design number is the FO.108 (the Gnat is FO.141). Although the second FO.108 P1775 was fitted with the Bristol Hercules VIII and later, the Centaurus IV, this view shows it with a Hercules III with extremely long-chord cowling.



VULTEE F.T.B. (P. & W.).—Something of a "mystery ship" is NX-14980 which has the tail assembly of the well-known three-seat Vultee V-11-GB—mainly built as an export attack-bomber—but little else to identify it. The fixed undercarriage is even more functional than that of the Folland F.T.B. (*above*). The enclosed single-seat cockpit is almost hidden by the wing. The engine is a Pratt & Whitney 2-row radial. Note the ventral D/F loop and aerial mast.

Letters to the Editor





The He 100 (*top*) and He 118 (*below*) sent to Japan during World War II for evaluation by the Japanese Air Forces. (*Photos: H. J. Nowarra, Berlin, Germany.*)

A TOUGH NUT

IN the article "Strangers in the Camp" (*Air Pictorial*, March) your correspondent refers to the Aeronca C-3, G-AEFT. This was at one time the property of Mr. Paul Simpson and myself. We found the machine, minus bracing wires, cowlings and other oddments in a barn near Woking in 1950. It was fitted with the early E.113C single-ignition engine which Simpson later modified to dual ignition.

The aircraft had been collected the previous year from the Isle of Wight where it had hibernated during the war. In 1938 it made a forced landing in the sea and sank. It was fished out and stripped down. Salt-water corrosion had adversely affected the fuselage, but the well-varnished woodwork of the wings had resisted the saline bath. A new fuselage was obtained and the machine reconstructed. Painted all silver with a blue flash, it took the air once more, but the outbreak of war intervened. During this period, the machine must have been stripped again for when we found it it was resplendent in red primer, tar and other farm by-products.

We began the task of reconstruction aided by the remains of Simpson's first Aeronca 100, G-AEVT, which had made a vertical descent into a ditch the previous year. It was at this stage that I relinquished my share (but not my interest) in the machine and Simpson took on the task single-handed. He decided to enhance accessibility to the cabin by cutting away tertiary structure on the starboard side and making a second door. The machine was test-flown at Denham early in 1955 and spent until January of this year at Panshangar. It is now resident near Newcastle.

It may be of interest to recall that the Aeronca Ely 700, a variant of the C-3, also had two doors and a fuselage about ten inches wider. One example appeared on the British Register—G-AEVE. Paul Simpson acquired the wings of this Ely and converted them to standard "100" or C-3 wings by the alteration of the aileron pulley locations at the root end. These wings flew on G-AEVT whose original wings rotted beyond repair during the war. The fuselage of 'EVE, last seen lying in the open at some R.A.F. station, is no more.

In the same issue of *Air Pictorial*, reader N. Collier refers to the Handley-Page H.P.42 broken up at Exeter. This was in all probability G-AAXD "Horatius" which was wrecked in a forced landing at Tiverton, Devon, on 7th November 1939.

It might be as well to record briefly once and for all the fates of these great airliners, eight of which were built in 1930–31 expressly to the order of Imperial Airways.

G-AAGX "Hannibal"—Prototype; completed Oct. 1930; lost in Persian Gulf on flight to Jask, 1/3/40.

G-AAUC "Horsa"—Completed 1931; impressed into R.A.F. during 1940 and subsequently broken up.

G-AAUD "Hanno"—Completed 1931; impressed into R.A.F.; blown over by gale and destroyed, 19/3/40.

G-AAVE "Hadrian"—Completed 1931; impressed into R.A.F.; based Odiham, 1940; Serial No. AS982.

G-AAXC "Heracles"—Completed 1931; impressed into R.A.F. and suffered same fate with G-AAUD.

G-AAXD "Horatius"—Completed 1931; wrecked in forced landing, Tiverton, on 7th November 1939.

G-AAXE "Hengist"—Completed 1931; destroyed in hangar fire at Karachi on 31st May 1937.

G-AAXF "Helena"—Completed 1931; impressed into R.A.F. and dismantled at Donibristle late in 1940.

The R.A.F. used these great machines, whose landing speed was only 50 m.p.h., as transport aircraft. When first they appeared in service with Imperial Airways, their luxuriant furnishings and extreme comfort set entirely new standards for passenger flying, surpassed only, of course, by the airship.—**A. W. J. G. Ord-Hume, 24 Evelyn Drive, Pinner, Middx.**

"WRITE-OFF" FLIES AGAIN

ONE of the biggest aircraft repair jobs to be undertaken in this country was recently completed at Northolt Airport. It concerned ex-U.S.A.F. Douglas C-54D-5-DC Skymaster 42-72721A which was the personal aircraft of the Commanding General of the 7th Air Division (SAC) which has its H.Q. at South Ruislip.

The aircraft suffered extensive fire damage during last summer and, since no tenders were received for its repair, the aircraft was written off and sold as scrap to World Airways Inc. of New Jersey who, in turn, were unable to persuade anyone to take on its restoration.

Eagle Aircraft Services Limited, of Blackbushe Airport, subsequently offered to carry out this task. The project entailed the rebuilding of two-thirds of the fuselage, the acquisition and installation of electrical equipment and four new power plants, and complete rewiring of the aircraft. Spare parts were obtained from all over Europe; and the work was completed in three months.

The aircraft was test flown on 5th March, and the following day was flown back to the U.S.A. in civil guise as N2079A. —**A. Pearcy, Bovingdon, Herts.**

FOR 210 READ 410

WHILST re-reading the August 1955 issue of *Air Pictorial* the letter on rare Japanese Aircraft from a Mr. P. G. Ward caught my eye.

In it he mentions the Me 210 and 410, and goes on to say that the 210 was sent to Japan during the last war for testing.

Actually it was the Me 410 which went to Japan and Kawasaki were to produce the machine under licence. Test pilot Willy Stoer delivered two Me 109Es and the Me 410 and in exchange was to fly back to Germany a Mitsubishi Ki 46-2 "Dinah".

Also sent to Japan were the He 100, He 112V-12 and the He 118. My photographs show the He 100 and He 118V-4 which were ferried over.—**H. J. Nowarra, Berlin NW 87, Rostocker Str. 51.**

THE SHORT SCION

THE recent article on the Short Scion (*Air Pictorial*, March 1956) has raised some interesting queries, especially as regards the status of G-AEZF, which has been "hangar-flying" at Croydon for some years. This is an interesting aircraft; as far as can be discovered it was the last Scion to be built and was intended as an experimental machine to test the Pobjoy Niagara Mk. 5. This engine was introduced in June 1937.

The Pobjoy-built Scions, Type number S.16/1, were given c/n. in a separate series, and a minor mystery attaches to these. Those positively identified are given below:

P.A.1003 -AEIL—Registered by Arabian Airways, 4/3/38.

P.A.1004 -AEJN—Registered by C. J. M. Alington, 28/3/38.

P.A.1005 -AETT—Registered by Pobjoy, 24/2/37.

P.A.1008 -AEZF—Original registration not known at present.

This leaves one Pobjoy-built Scion unaccounted for; I think that this was probably -AEOY, which was registered by Arabian Airways in November 1937 and crashed in April 1938. However, this had a Short c/n. S.789, according to the official records. It is, though, quite possible in my view that S.789 was actually -ADDS, a registration which was never taken up as the aircraft in question became VH-UUT, and -AEOY was P.A.1006 or 7.

This still leaves at least one Pobjoy c/n. unfilled. (It is possible that the first two numbers were not used because the airframes in question had been commenced at Shorts' factory and already bore their c/n.). The remaining "lost" number in the P.A. series is perhaps -ADIP, a Scion Senior for which I have been unable to find a c/n. Did Pobjoy ever build a Senior? There may be a reader somewhere who can clear these points up. Since the war, -AEZF has been owned by F. J. Parsons and M. J. Conroy. Its C. of A. expired 5/5/54 and has not, to date, been renewed.—**J. H. Blake, 3 Ovington Square, London, S.W.3.**

THE EXTRAORDINARY PIAGGIO P.23

I WOULD be grateful if *Air Pictorial* could find space to publish the rare photographs (below) of the Piaggio P.23. Perhaps William Green would care to comment on these little-known types; his excellent Italian series was tops.—**Peter M. Grosz, Rosedale Road, Princeton, N.J., U.S.A.**

*(The Societa Anonima Piaggio & C. has been responsible for a number of highly original designs since it commenced aircraft manufacture forty years ago, writes William Green, and among several interesting Piaggio designs of the mid-*1930*s were the P.23M and P.23R produced between* 1934 *and* 1936. *The original version of the design, the P.23M (Photo 1) was built as a fast commercial transport with four* 900*-h.p. Isotta-Fraschini Asso XIR engines, two mounted as pushers and two as tractors.*

*Derived from the earlier P.*16 *tri-motor bomber of* 1934, *the P.23M incorporated a form of arched spar, and the wing carried hydraulically-operated double-camber flaps extending over the whole span, the outer sections also serving as ailerons. Of all-metal construction, the P.23M had a range of* 3,100 *miles at* 186 *m.p.h. with a useful load of* 24,250 *lbs. From the P.23M was developed the P.23R, although the redesign was so extensive that the latter type bore little resemblance to the P.23M.*

The P.23R possessed exceptionally clean lines and, while the double flaps employed by the P.23M were retained, an entirely new wing was adopted, this being set in low-mid position and carrying two of the three 900*-h.p. Isotta-Fraschini Asso engines. The P.23R established records over* 621.37*-mile* (1,000 *km.) and* 1,242.7 *mile* (2,000 *km.) distances carrying* 11,023 *lbs.* (5,000 *kg.) at* 250.973 *m.p.h.*

Photo 2 *depicts the Asso-powered P.23R and Photo* 4 *shows the same machine after the installation of three* 1,000*-h.p. Piaggio P.XI RC radials.*

Photo 3 *shows the leading-edge slots and camber-changing flaps fitted to the P.23R. It is of interest to note that the design was further developed by the Officine Meccaniche Italiane S.A. (Reggiane) as the Ca.* 405 *Procellaria in* 1937. *Subsequently, both Piaggio and Reggiane produced bomber developments designated P.*32.)

THE FINAL CLUE

THE March edition of Photo Review interested me greatly, especially the picture of the rare Bréguet Br. 482 research bomber F-WFRM.

In August 1951, I was cycling my way back through central Southern France from a visit to Spain; and arrived at Toulouse where I paid a short visit to the main airport at Blagnac, some three kilometres northwest of the city. Entrance was gained to most of the buildings by requesting the privilege, including the Bréguet experimental hangar which contained amongst other aircraft, the Prototype 76-1 Deux Ponts F-WFAM; the prototype 89-2S Mercure F-WFDO and an unidentified aircraft which I noted as . . . "a four-engined, shoulder-wing monoplane with twin fins and rudders and a large glazed nose, registered as F-WFRM".

It is most gratifying to have your consequent identification and confirmation of this aircraft after such a long time of searching.—**P. F. Wright, Cavendish House, 40 Waterloo Street, Birmingham 2.**

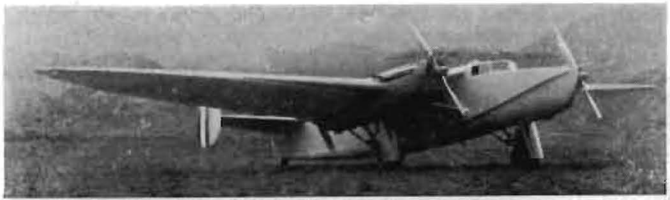
NOSEY VARSITY

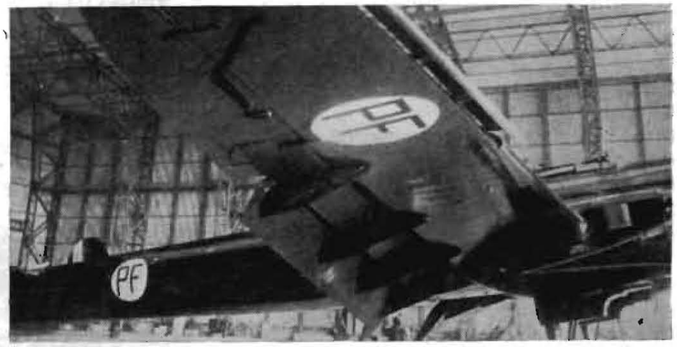
A VARSITY with a projecting nose radar has been operating from R.R.E. Defford. The machine lacks the usual training bands and is serialled WF379.

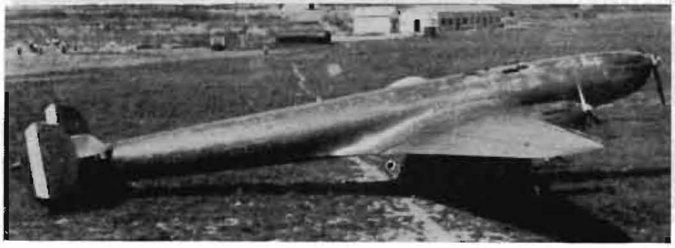
The similarly equipped Freighter VR382 is still flying as are the Hastings TG503 and

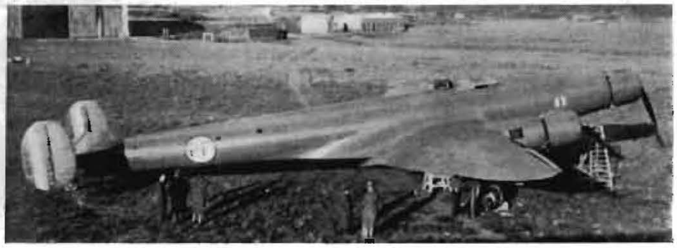
(*Continued overleaf*)

Top left: P.23M;
Bottom: P.23R.
Top right: P.23R.
Bottom: P.23R.
(Photos: P. M. Grosz, Princeton, N.J., U.S.A.)









LETTERS *(Continued)*

WD482, which carry ventral radar in a large bulge.

Other aircraft seen in the Defford area include the Canberra 3 prototype VX181, and the hybrid Canberra NF VN181, which lacks the radar nose fitting.—**B. W. Wilkes, Newland House, Salwarpe, nr. Droitwich, Worcs.**

MYSTERY MACHINE

COULD any reader of *Air Pictorial* give me a clue to the identity of an aeroplane I sighted on the afternoon of 14th May flying over Thetford, Norfolk.

The wing of the machine, which was tapered with square-cut tips and leading-edge sweep, was of high aspect-ratio, and span appeared equal to that of the Britannia. The jet engines, which were mounted Javelin fashion, were fed by cheek intakes placed either side of a long, slim fuselage, rather like the Fouga Magister. Tailplane was small, as was the moment arm.

As it passed overhead, with fuselage-mounted dive brakes extended, two Provosts flew underneath it and it completely dwarfed them. It carried no markings and the natural metal finish made it look suspiciously American.

It banked steeply, accelerated and flashed across the sky in the direction of Ely. My friends and I, who pride ourselves on our standard of recognition, were completely mystified.—**S. Thompson, Thetford, Norfolk.**

AT 2.10 p.m. on 14th May I saw what appeared to be a Valiant approaching from Thetford. As it circled Ely Cathedral I could see it was a large, twin-engined aircraft with a long, thin fuselage, pointed radar nose and small cockpit. The air intakes were similar to those of the Javelin, as were the orifices.

The wings were set well back on the fuselage, extremely thin and slightly swept. Two small black-painted fuel tanks or armament pylons were fitted.

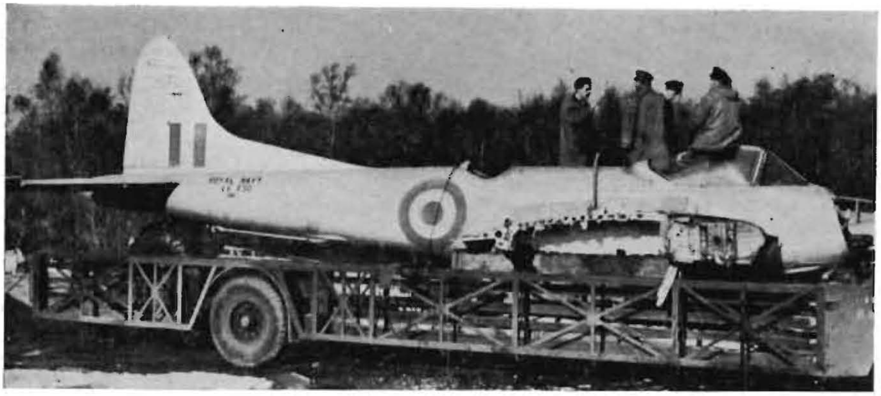
The tail unit was similar to the Valiant's but the fin was narrower. The aircraft was devoid of markings and the natural metal finish was highly polished.—**A. P. J. Newstead, Ely, Cambs.**

DURING the week of 14th to 19th May I was staying with a friend in Norfolk and several times I spotted a new and extremely interesting aeroplane.

Wing span was huge and the wings were of high aspect-ratio. The jet engine sounded as though it was in the 8,000-lb. class and it was fed by intakes similar to that of the Javelin.

My friend and I were puzzled by this machine and would like to discover what it is.—**D. Spincer, Southampton.**

(The "Mystery Machine" is a Lockheed U-2 used for high-altitude research. One is stationed at the U.S.A.F. base at Lakenheath and can often be seen in the Norfolk area. The U-2 is subsonic and capable of only about Mach .75 although it is powered by the Pratt and Whitney J57. Apart from other duties, including Cosmic Ray research, the U-2 was used to gather fuel-flow and fuel-metering data for the Lockheed F-104A Starfighter. All other details, span, length, etc., are restricted.—ED.)



The first production Sea Hornet NF.21 on the way to the scrap yard. *(Photo: C. Bruce, Bournemouth.)*

FAREWELL VV430

I ENCLOSE a photograph (above) of a Sea Hornet NF.21, serialled VV430, which I am sure readers will recognise by the serial as being the first production aircraft of this type.

Since March 1953, and until the grounding of Sea Hornets in October 1955, this aircraft has been flying with a unit of 771 Fleet Requirements Squadron, Royal Navy, based at Hurn.

When it was grounded VV430 was parked in the open together with a dozen other Sea Hornets of this unit for some months. They were then dismantled and shipped away.

A point of interest about this particular machine was the flash carried on the fin, a practice that was dropped by the Royal Navy a number of years ago.—**Colin Bruce, Bournemouth.**

READERS may like to know that Sea Hornet NF.21 VV430, the first production model, has been broken up. I saw this aircraft stacked on a "Queen Mary" trailer in Wigan during February.

The wings had been crudely hacked off inboard of the engines and it looked a sorry sight. It was finished in silver aluminium paint and was accompanied by another Sea Hornet NF.21, VZ677, also in a dilapidated condition.—**A. F. Bullough, Abram, nr. Wigan, Lancs.**

BACK-YARD SWASTIKA

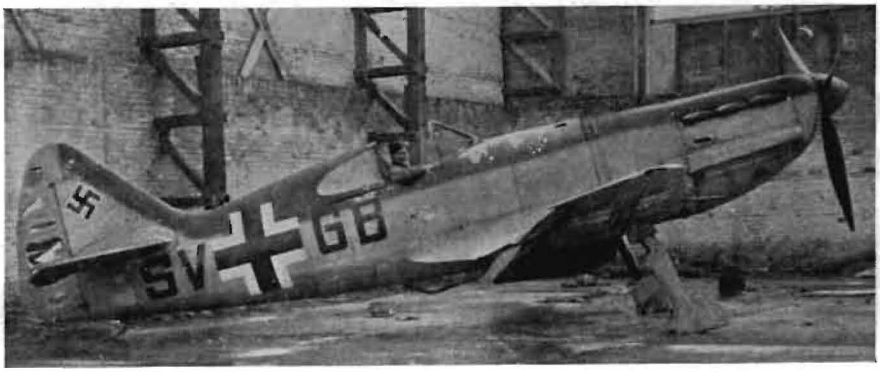
I READ with interest M. Cuny's letter concerning the Ju 88 remains (*Air Pictorial*, page 141, April 1956) and wondered if the field he mentions was located a few kilometres outside Brussels?

During May and June of 1945 I was serving with a motor vehicle distribution outfit, which was stationed at Antwerp. Daily we drove to this field and hauled away the remains of German, British and American aircraft. There was vast stores of 20-mm. ammunition which we left to rot.

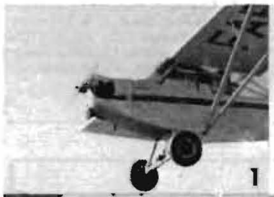
In a hangar was a Dewoitine D.520 (see photo below) with the colouring and German crosses as mentioned by M. Cuny. The colour scheme was: topside brown, blending into grey-blue sides and wingtips, and the entire undersurfaces were bright yellow. I also saw many French aircraft taken over by the Germans painted black on the topsides and bright yellow underneath.

The Swastika from the fin of the D.520 is stored in a Quonset hut in my back yard.—**Frank C. Hartman, Charlottlesville, Virginia, U.S.A.**

Only a few D.520 fighters were in service with the French Air Force when France collapsed. Several saw service with the Luftwaffe and were painted, as this photograph shows, brown on top with light blue/grey undersurfaces. *(Photo: F. C. Hartman, Virginia, U.S.A.)*



"Tops, Tips and Tails" *(For answers see page 256)*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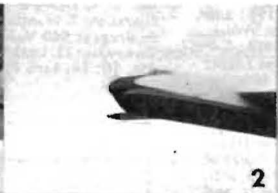
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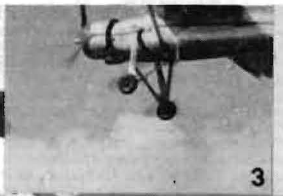
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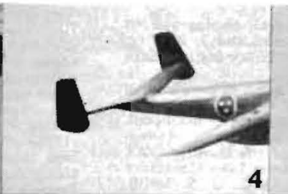
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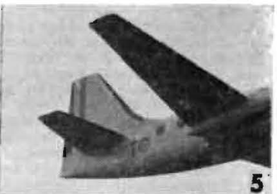
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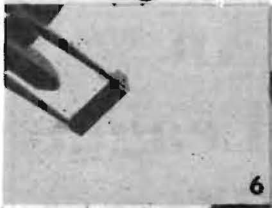
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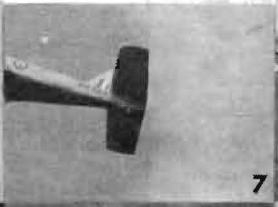
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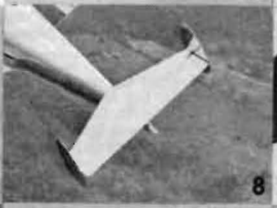
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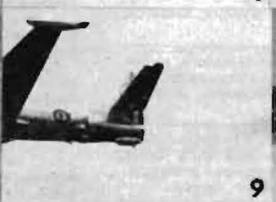
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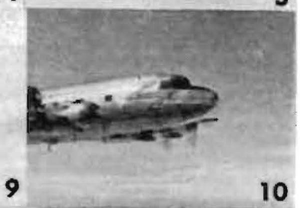
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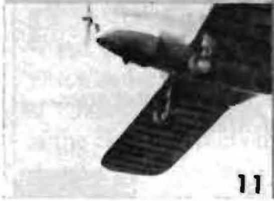
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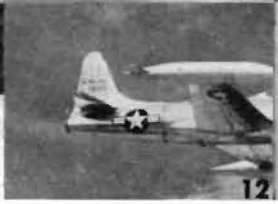
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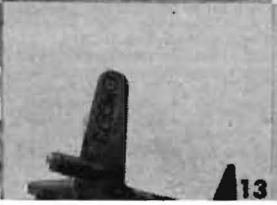
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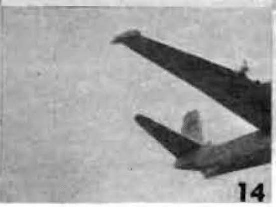
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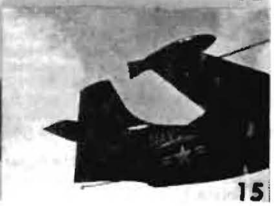
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BRITISH REGISTRATIONS IDENTIFIED

by F. A. Hudson, British civil register specialist of Registration Research

G-ACYR	Dragon Rapide (c/n. 6261); Reid & Sigrist Ltd.; dismantled at Croydon 1953
G-AFXA	Hawk Trainer 3 (c/n. 1081); impressed as BB666, allotted registration G-ALOG but restored as G-AFXA, registration cancelled as "Not used" (although painted on aircraft); dismantled at Croydon
G-AGAT	Not allotted
G-AGOD	York C.I (c/n. 1231, ex-TS806); used serials WW576 and WW577 while trooping; sold as EP-ADC
G-AHEJ	Constellation 049E (c/n. 1975, ex-42-94554); B.O.A.C. "Bristol II"; sold to Capital Airlines as N2740A
G-AHEL	Constellation 049E (c/n. 1977, ex-42-94556); B.O.A.C. "Bangor II"; sold to Capital Airlines as N2736A
G-AHFC	York C.I (c/n. 1306); Skyways Ltd.; sold to Lebanon 1955
G-AHOR	Viking IA (c/n. 118); Airwork Ltd.; sold as ZS-DNU 1955
G-AHZB	Sandringham 5 (ex-NJ171); B.O.A.C. "Portland"; crashed on landing at Bahrain 23/8/47
G-AHZC	Sandringham 5 (ex-NJ253); B.O.A.C. "Pembroke" now owned by Mentra Ltd.; stored at Hamworthy
G-AIEL	Tiger Moth (c/n. 3937, ex-N6633); R. H. Braime and partner; crashed at Sherburn in Elmet 15/9/51
G-AIJB	Tiger Moth (ex-T6319); W. A. Rollason Ltd.; sold as PH-UDB
G-AIJC	Tiger Moth (ex-N5461); W. A. Rollason Ltd.; sold as PH-UDA
G-AIPY	Autocrat (c/n. 2206); Mrs. F. G. Mylard, Thruxton; sold abroad 1950
G-AJBI	Dove I (c/n. 04026); Morton Air Services "Clyde"; has carried registrations XY-ACE and AP-AFT; re-sold to Pakistan 1955
G-AJCE	Viking IB (c/n. 256); B.E.A.C. "Vivacious" and "Lord Exmouth"; sold to Eagle Aircraft Services then to Sweden, but British marks not removed, restored to Independent Air Travel Ltd. 1956
G-AKCE	Constellation 049E (c/n. 1971, ex-NX54212 and 42-94550); B.O.A.C. "Bedford", sold to Capital Airlines as N2741A
G-ALIE	Anson 11 (ex-NL186); R. L. Whyham; broken up at Carlisle 1951
G-ALJJ	Beech Expeditor (c/n. 8468, ex-VR-HED, PI-C-843); Stewart Smith & Co. Ltd.; sold as VH-KFD
G-ALMS	Proctor 3 (c/n. K383, ex-Z7194); K. C. Millican; dismantled at Croydon
G-ALNN	Beech Traveller (ex-LN-HAK, FT473 and 44-67722); Airwork Ltd.; sold as F-OACT 1949
G-AMAI	Dragon Rapide (c/n. 6879, ex-NR803); A. G. Sheppard, Richmond; sold to Spain
G-AMAR	Tiger Moth (c/n. 82119, ex-N6864); Central Aeronautical Bureau; sold to Switzerland 1953
G-AMLR	Bristol 170/31 (c/n. 13679, ex-G-18-120); Bristol Aeroplane Co.; sold to R.C.A.F. as 9698
G-AM5K	Dakota 4 (c/n. 16206, ex-KN477, 44-76622); Hunting Clan Air Transport, sold to South Africa
G-AMVY	York C.I (ex-MW292); Hunting Clan Air Transport; dismantled to complete G-AMXM

FOREIGN REGISTRATIONS IDENTIFIED

by F/Lt. D. A. S. McKay, D.F.M., overseas civil register specialist of Air-Britain

D-ABIR	Viking IB (c/n. 223, ex-G-AIVJ); Flugzeugeigner Gesellschaft Seibert-Sachsenberg-Conle
D-ADAM	Viking IB (c/n. 217, ex-G-AIVD); Flugzeugeigner Gesellschaft Seibert-Sachsenberg-Conle
D-EBUF	Bücker Bü 181 (c/n. 25049, ex-SE-CBC); Deutscher Aero Club
D-CAFU	Learstar (c/n. 2499, ex-N-1Y, F-BDA5, 42-56026); F. Krupp
D-IDEL	Avro XIX (c/n. 1323, ex-N-9924F, G-AHIH); Aero Exploration K.G.
CF-IMB	Mosquito 35 (ex-VP200); Spartan Air Services
EI-AGQ	Anson I (ex-G-ALXC, MH182); Republic Air Charter (J. J. Crowley)
F-BEYN	SIPA S.901 (c/n. 11); Aéro-Club de Moulins
F-BFPB	Autocrat (c/n. 2317, ex-G-AJEM); Ailerons d'Enghien-Moisselles
F-BGTD	SCAN 30/1 (c/n. 19); Aéro-Club de France
F-BGOC	DC-6B (c/n. 43834); Transports Aériens Intercontinentaux
F-DABP	Super Cub 135 (c/n. 18-2937); Société Aérotechnique
F-OANR	Heron 1B (c/n. 14038); Cie. Aéromaritime
OO-AWE	Dove (c/n. 04013); Institut Géographique du Congo Belge
OO-DOL	Bonanza (c/n. D.3346); Autostrade Motors S.A.
OO-ESD	Navion (c/n. 1252, ex-HB-ESD, N-4252K); Chev. P. de Selliers de Moranville
OO-INT	Proctor I (c/n. H.195, ex-G-AJWN, HM288); Imextraco S.A.
OO-SBB	DC-3 (c/n. 13033, ex-KG550, 42-93153); last owner SOBELAIR S.A.; now cancelled
OO-WAL	Argus 2 (c/n. 391, ex-OO-ADH, F5510, 43-14427); Club National d'Aviation
PH-LKE	Lockheed 1049G (c/n. 4629); K.L.M.
PH-NGP	Hiller UH-12C (c/n. 776); Aero-Ypenburg N.V.
SP-LHA	Ilyushin IL-12; Polskie Linie Lotnicze "LOT"
SP-LNC	Ilyushin IL-14 (no. 4340509); Polskie Linie Lotnicze "LOT"
TJ-AAY	Consul (c/n. 5129, ex-TJ-ABF, G-AJLK, and Oxford HM780); Air Jordan
VH-UUR	Klemm L 25D XI (c/n. 796); A. Oliver
VH-MPW	Auster J/5F Aiglet Trainer (c/n. 3138); Kingsford Smith Aviation Service Pty. Ltd.
VH-BYU	Auster J/5P (c/n. 3155); Guinea Airways Ltd.
VP-YAX	D.H.90 Dragonfly (c/n. 7512); Rhodesia and Nyasaland Airways (R.A.N.A.); no longer registered

INFORMATION WANTED

Information regarding serial of Ashton at Luton on 9/4/56, and the serials of the De Havilland test fleet at Hatfield on the same day.—R. P. Applewhite, 16 Alresford Road, Alkrington, Middleton, Lancs.

Wanted urgently, registrations of all foreign aircraft operating into London Airport on 20th and 21st May 1956. Especially interested in any visitors.—B. Ratcliffe, 13 Ravenscourt Road, Southbourne, Bournemouth, Hants.

Details of R.A.F. squadron markings, old or new, and information on squadron histories—will correspond on these two subjects. For disposal many early copies of the *Aircraft Recognition Journals* and the *Aeroplane Spotter*.—James Walsh, 10 Riddings Close, Sheepridge, Huddersfield.

Should like information about U.S. Army and Navy squadrons of the 1930s and could offer photographs or magazine cuttings on the aircraft used.—P. W. Benson, 17 Ambrose Drive, W. Didsbury, Manchester 20.

Details of whereabouts and of aircraft using civil and military airfields in the Rhine Valley region between Cologne and Frankfurt.—P. C. Redfern, 17 Chestnut Drive, Sale, Cheshire.

WANTS, DISPOSALS AND EXCHANGES

Wants

Serials and fates of aircraft not on the current British Civil Register; list of aircraft, and registrations, at the 1951 "Fifty Years of Flying" Display at Hendon.—G. Salmon, 51 Holdenhurst Avenue, London, N.12.

The book *Hurricane* and *Hawker Hurricane in the Battle of Britain*, also any *Observer's Book of Aircraft* from 1952–, write and state date of issue.—J. L. McDonald, No. 6 R.D., Forest Hill, Invercargill, Southland, New Zealand.

A.F.P., Vol. 6.—3143802 Cpl. Humphreys, 2TTs., R.A.F. Cosford, Wolverhampton, Staffs.

Photographs, preferably 8 in. × 10 in., of the following aircraft: Heinkel 176, Heinkel 178, Heinkel 280V, Fieseler fZG 76 or 103, Messerschmitt P.1101, Ardo 240V-3, Blohm Voss 155C, Junkers 287V-1, Junkers 248V-1, Nakajima J8N1 Kikki, and Oka 22 and 11. Also any Russian jet photographs.—Richard J. Eyman, 3286 Columbus Ct., Apt, 8 Columbus 9, Ohio, U.S.A.

Aircraft photographs particularly German, Japanese, British (pre-1925 post-1945). *Aeronautics*, issue Feb. 1952, July 1954. Any books of historical nature in particular *War in the Air 1914–18*, Raleigh and Jones. *A.T.C. Gazette*, Mar., April, May, Sept. 1941–; *Air*

(*Continued overleaf*)

WANTS, DISPOSALS, ETC.

(Continued from previous page)

Pictorial, Jan., Feb., Mar. 1950, July 1951, Feb. 1942.—F/I R. Morris, R.C.A.F., Saskatoon, Saskatchewan, Canada.

Correspondent to exchange aircraft photographs in New Zealand, Australia, Africa, India and S. America (English speaking).—R. H. Watts, Police Station, Bath Road, Padworth, Berks, England.

Diagrams showing the cockpit layout of controls and instruments of Spitfires. State own price.—J. H. Spencer, 14 Cypress Avenue, Cleveleys, Nr. Blackpool.

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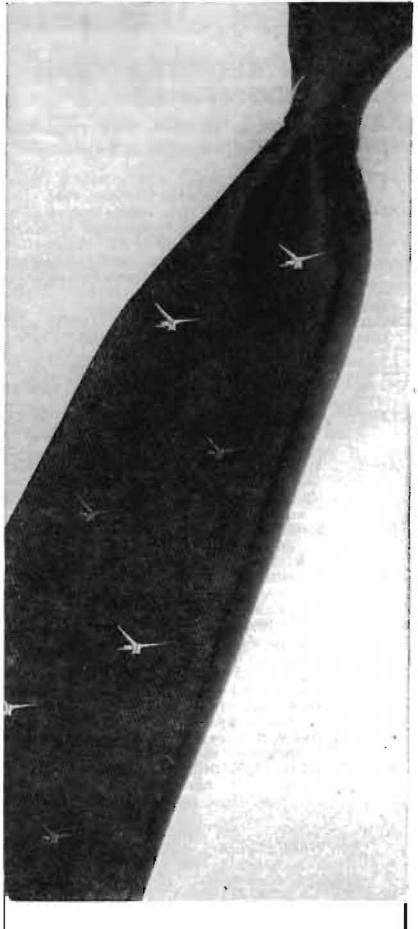

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